35th Year SEPTEMBER, 1951

RUBBER AGE

LOWER STYRENE GR-S is here!

TRY

REOGEN-BONDOGEN

For Better Processing

AND

CUMATE-BISMATE

For Speedy Cures

R. T. VANDERBILT CO. INC.

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WHAT ENTHUSIASTIC USERS SAY ABOUT

RR-10

Du Pont's new reclaiming agent

- *"We've tried RR-10 and the results are excellent. It looks especially good in Banbury reclaiming."*
- *"We've found RR-10 an effective remedy for bringing back scorched neoprene stocks."*
- *"RR-10 is outstanding in straight GR-S scrap and does an excellent job in the pan process."*
- *"0.1 to 0.3 part of RR-10 in natural and up to 0.6 part in GR-S produces high quality reclaim in both cases."*
- *"One percent RR-10 does a real job in reclaiming mixtures of GR-S and high styrene resins."*
- *"RR-10 works very well in our special Banbury reclaiming operation."*

The above comments by present users of RR-10 are indicative of the job it is doing in a variety of reclaiming operations. If you're making reclaim and haven't tried this new and better reclaiming agent, don't fail to do so. See your Du Pont representative or write us for samples and literature on its use.

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Akron, Ohio	40 E. Buchtel Ave.	HEmlock 3161
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DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. September, 1951. Vol. 69, No. 6.

Another development using

B. F. Goodrich Chemical Company *raw materials*

This valve a product of Dairy Whipt Division of Aerated Container Corp., Chicago, Ill.

Seal that puts the sale in Aerosol packages!

B. F. Goodrich Chemical Company does not make the aerosol or its components. We supply the raw materials for the valve seal only.

THESE ingenious aerosol, or "pressure" packages score a sales success everywhere. They're used for many products—from mist sprays to food and cosmetics. One of the tough problems in perfecting them was developing a valve that would provide a leak-tight seal. The valve had to contain a sealing compound that would also withstand oils, solvents, alkalies—and where necessary, be tasteless and odorless. When Hycar rubber sealing compounds were tried, they filled the bill on every count!

Because Hycar is so versatile, valves can be made to perfectly suit varying packaging requirements. One type helps "fluff" whipped cream. Another helps shampoo flow properly. Still another does a job of "misting" insecticides.

They're all examples of the wide variety of applications for Hycar. For Hycar can be compounded to resist gas, oils, solvents, detergents and other corrosive elements. It resists heat and cold, weather and wear. Continual or intermittent flexing has no effect on Hycar compounded parts.

Hycar is used in many ways, to develop or improve both civilian and defense products. Demand exceeds supply, but limited quantities are available for development work.

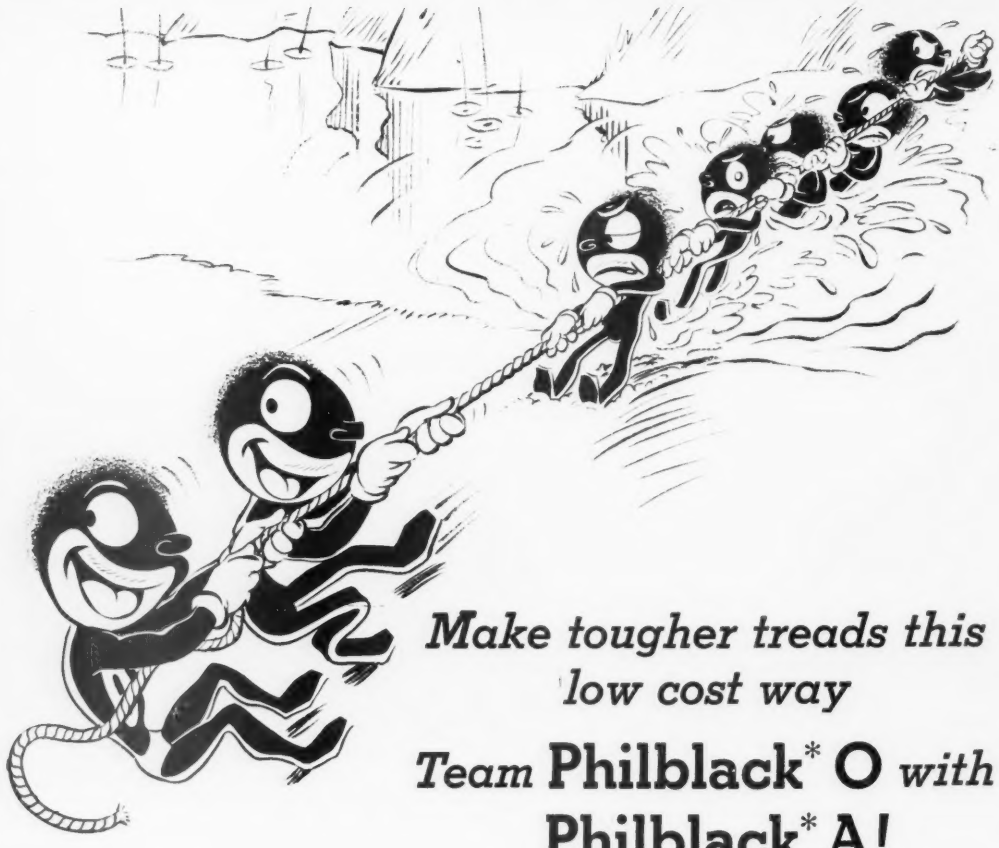
For helpful technical advice, please write Dept. HA-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Need high elasticity? Hycar has it—plus extreme temperature resistance and more advantages.

Hycar
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors



Make tougher treads this low cost way

Team Philblack* O *with* Philblack* A!

Champion performance! For original treads, camelback, conveyor belt covers . . . wherever you need a tough, low-cost rubber compound, you can't beat mixtures of Philblack O and Philblack A, especially in a ratio of approximately two to one.

Such blends closely approach straight channel black compounds in tensile strength and are superior in flex life, abrasion resistance, heat buildup, compression set and resilience. Excellent with cold rubber!

Both Philblack O and Philblack A are shipped in either hopper cars or bags. Our Sales Service Laboratory in Akron is always anxious to help you analyze the results these Philblacks will give in your natural or synthetic rubber stocks.

PHILLIPS CHEMICAL COMPANY

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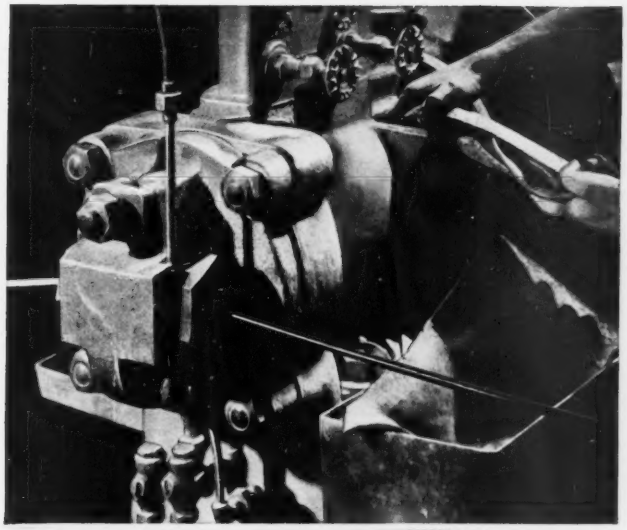
* A Trademark

Philblack A and Philblack O are manufactured at Borger, Texas. Warehouses in Akron, Boston, Chicago and Trenton.
West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

for easier processing

in insulation of electric wiring—

try PLIOLITE S-6B



CHECK THESE ELECTRICAL PROPERTIES

Specific Volume Resistivity

	test voltage	ohm-cm X 10^{14}
Dry	1.35	2
	14.75	30
Wet	1.35	4
	14.75	60

	1000 cycles	1 megacycle	60 megacycles
Dielectric Constant			
Dry	2.64	2.55	2.36
Wet	2.69	2.60	2.38
Power Factor %			
Dry	.033	.140	.100
Wet	.043	.040	.290
Loss Factor			
Dry	.00087	.00357	.00236
Wet	.00116	.00104	.00690

USE PROVED *Products*

Pliolite—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

EXTRUDERS of insulated wire and cable are finding that they can produce a high-quality product with PLIOLITE S-6B – Goodyear's high styrene butadiene copolymer for rubber reinforcement. And PLIOLITE S-6B brings easier processing, too – faster stock preparation in the Banbury or on the mill, faster, smoother extrusion, reduced shrinkage and permissible higher loading. Exactly centered thin-walled insulated wire is easier to produce when you turn to PLIOLITE S-6B.

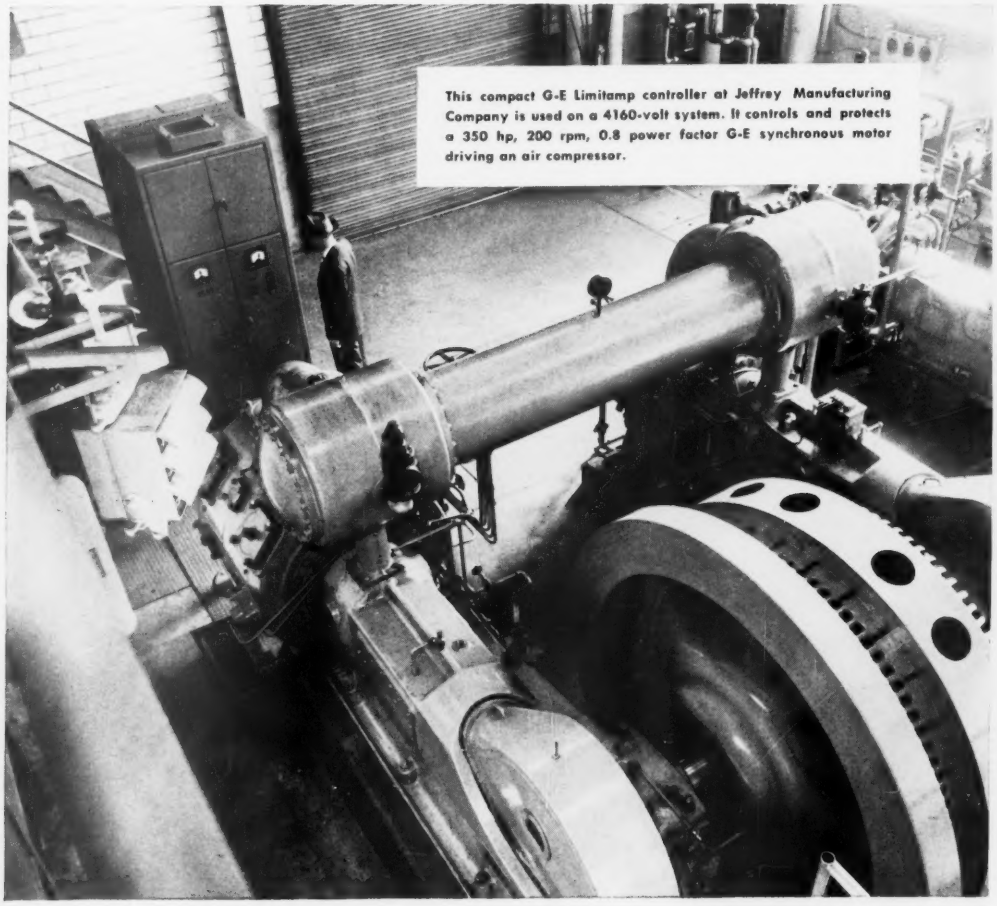
You'll find that PLIOLITE S-6B gives excellent electrical properties, as well as improved tensile, elongation, hardness and tear to the rubber. Its low gravity and light color are further advantages. The table here will show you the electrical properties PLIOLITE S-6B offers you—and laboratory tests will tell you the balance of the story.

Send now for full details and sample for evaluation, so that you'll be ready for the full availability of PLIOLITE S-6B when current shortages are overcome. Write today to:

Goodyear, Chemical Division
Akron 16, Ohio

GOODYEAR

Jeffrey Manufacturing Uses G-E Limitamp Control



This compact G-E Limitamp controller at Jeffrey Manufacturing Company is used on a 4160-volt system. It controls and protects a 350 hp, 200 rpm, 0.8 power factor G-E synchronous motor driving an air compressor.

This high-voltage control meets a need for ample interrupting capacity, protection for operating personnel, good appearance and compactness

The addition of a large compressor for general plant use called for a synchronous motor and dependable high-interrupting-capacity control at Jeffery's modern power house. In addition to the accurate synchronization obtained with the new field control of this air-break Limitamp controller, and the factors mentioned above, Jeffrey likes the co-ordinated design of this G-E controller that is factory engineered and built. Such a compact, steel-enclosed controller is easily installed, requires little space—yet has all the features that provide protection for both equipment and personnel. And it's quickly inspected and maintained.

Rapid duty cycles do not affect the long life inherent in G-E Limitamp—now available in ratings up to 4800 volts with an interrupting capacity up to 250 mva. Shorts are cleared in less than half a cycle—offering positive protection for your expensive electric equipment. Write for more information on the new Limitamp controller—also available for squirrel cage and wound rotor motor control—in Bulletin GEA-5409. *General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

730-27

Product Ideas that ring the bell

We cover the waterfront in scientific service. Working with our Latices, Lotols and Dispersites, we have improved hundreds of products. Our laboratory spends well over $1,000,000 every year on research and development. See what we can do for you. *For complete information write to Connecticut address below.*

A few typical Naugatuck-processed products shown above: Upholstery fabric, hair stuffing, paper bags, rubber gloves, surgical supplies, chewing gum (Double Bubble), rug backing and underlay, traveling bag, gear-shift cover.

Lotol® Compounded Latices—Ready to Use.

Kralac® Plastic Latices.

Nitrex® Butadiene Acrylonitrile Copolymer Latex.

Shrink-Master Process for Rendering Woolens Shrink Resistant and Long Wearing.

Latex Natural and Synthetic.

Kandar® Permanent Finish for Textiles.

Koloc® Cationic Resin Compositions for Cotton, Rayon and Wool.

Naugatex® Dispersed Chemical Compounding Ingredients for all Latices.

Kralastic® Flexible Plastic Latices.

Dispersite® Aqueous Dispersion of Rubber, Reclaimed Rubber or Resins.

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the VALUABLE PROTECTION

of "Dutch Boy" Stabilizers

Choose these for the best electrical insulation compounds

"DUTCH BOY" TRIBASE

Tri-basic Lead Sulphate. Tribase is the most basic lead sulphate available. It has a total lead content equivalent to 90% PbO, which means it affords maximum reactivity with the degradation products of vinyls caused by heat.

It is the quality stabilizer for vinyl insulation. The electrical characteristics and heat stability of vinyl compounds containing Tribase are unsurpassed!

"DUTCH BOY" TRIBASE-E

Basic Lead Silicate Sulphate. Tribase-E was specifically developed to answer the vinyl electrical insulation industry's demand for a stabilizer with exceptional heat stability and good electrical characteristics at low volume cost.

Tribase-E takes advantage of the electrical properties of lead silicates without sacrificing moisture repellency. The safe reactive lead content, together with the absence of any carbonate, eliminates danger of gassing.

"DUTCH BOY" DS-207

Di-basic Lead Stearate. When used with Tribase or Tribase-E, DS-207 improves processing characteristics, water repellent properties and light stability of your vinyl insulation stocks. DS-207 has a double utility when used in Vinyl Plastics. It is an excellent heat and light stabilizer; it is an effective lubricant.

"Dutch Boy" Stabilizers

PRODUCT	USE
TRIBASE (Tribasic Lead Sulphate)	Electrical and other compounds requiring high heat-stability
TRIBASE E (Basic Lead Silicate Sulphate Complex)	Low volume cost insulation
DS-207 (Dibasic Lead Stearate)	Stabilizer-lubricant for sheeting, film, extrusion and molded compounds
PLUMB-O-SIL A (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored sheeting and upholstery stocks
PLUMB-O-SIL B (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored film, sheeting, belting
PLUMB-O-SIL C (Co-precipitate of Lead Orthosilicate and Silica Gel)	Highly translucent film and sheeting
DYTHAL (Di-basic Lead Phthalate)	General purpose stabilizer for heat and light. Good electrical properties
DYPHOS (Di-basic Lead Phosphite)	Outstanding for heat and light in all opaque stocks, including plastisols and organosols
NORMASAL (Normal Lead Salicylate)	As stabilizer or co-stabilizer in vinyl flooring and other compounds requiring good light-stability

"Dutch Boy" Stabilizers—Tribase, Tribase-E, DS-207—impart excellent electrical properties, improved resistance to moisture, increased stability to heat and light aging.

They have maximum reactive lead content: they are widely compatible with other compound ingredients: they're economical.

And—like all "Dutch Boy" products—they're backed up by the solid reputation of the maker—National Lead Company.

Our technical staff will be glad to help you stabilize vinyl resins for any use. Write for complete information.

Dutch Boy* **CHEMICALS**

*Reg. U. S. Pat. Off.

NATIONAL LEAD COMPANY
111 Broadway New York 6, N.Y.

maximum whiteness
-softness-protection
against oxidation
with

Wing-Stay S

The maker of this foamed rubber powder puff needed maximum retention of whiteness and softness—coupled with low-cost protection against oxidation—in his product. WING-STAY S was his answer.

WING-STAY S—developed by Goodyear for the rubber industry—offers the best balance of antioxidant properties, superior nondiscoloring characteristics and economy of any antioxidant material. That's why so many makers of natural rubber items, latex products and light-colored or white molded and extruded articles turned to WING-STAY S. Now, its use in all GR-S 26 makes this rubber the ideal synthetic for a wide range of light-colored items.

Although WING-STAY S is currently in short supply, now is the time to evaluate this use-proved antioxidant in your own laboratory pending the return of full availability. Write today for full details and sample to:

Goodyear, Chemical Division
Akron 16, Ohio

PERMANENTLY WHITE, PERMANENTLY SOFT, *these powder puffs are protected against oxidation and discoloration by* WING-STAY S, *incorporated in latex foam during manufacture.*

Photos courtesy Sondra Foam Products

USE PROVED *Products*

GOODYEAR

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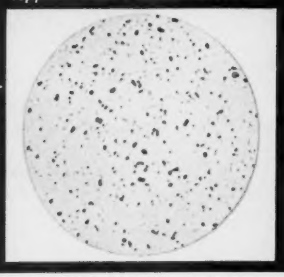
Wing-Stay—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio.

for finest quality

RUBBER AND LATEX PRODUCTS

Magnification 1500X
Approx. Scale: 1 Micron = 1/16 in.



ST. JOE BLACK LABEL #20

A fast curing type of very fine particle size, giving maximum reinforcement and activation in rubber.

Representative Chemical Tests

ZnO	99.20%
Pb	.03
Cd	.01
Mn	.003
Cu	.002
Acidity as SO_3	.03
Total S as SO_3	.05
H_2O soluble salts	.15
Insoluble in HCl	.15
Loss at 110° C.	.30

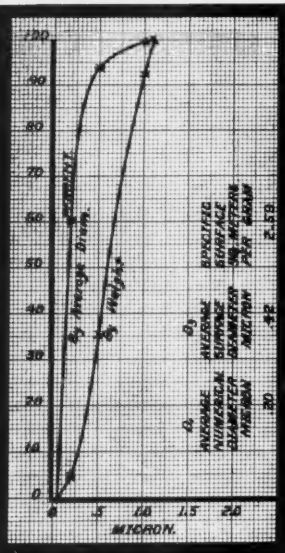
Representative Physical Tests

Particle size

Average numerical diameter D_1 — microns	.20
Average surface diameter D_2 — microns	.42
Specific surface — Sq.M./gram	2.59
Percent fines under .50 micron	35.0
Specific gravity	5.65
Apparent density — lb./cu. ft.	22.

Cleanliness

Percent thru 325 mesh screen	99.97



Particle Size Distribution

ST. JOSEPH LEAD COMPANY
250 PARK AVE.
NEW YORK CITY 17
Plant & Laboratory: Monaca (Josephtown) Pa.

For the finest quality products made from rubber and latex we recommend St. Joe Black Label #20 lead-free Zinc Oxide. Its uniform, extremely fine particle size develops maximum effectiveness of activation and reinforcement because of the greater particle surface area made available for reaction. Its uniform low acidity aids materially in the production of fast curing compounds.

Complete physical and chemical properties of St. Joe rubber grade zinc oxides are described in our new technical manual, ST. JOE ZINC OXIDES. Write for your free copy—on your company letterhead please.

When it's PELLETEX you KNOW...

Belts give Lasting Service

PELLETEX®

PELLETEX SRF carbon black is absolutely essential to the manufacture of best quality belts – the kind that show superior aging, resistance to flexing, fatigue, tear and abrasion.

The reason for this is that PELLETEX has properties superior to those of every other SRF black – it gives exceptional performance in friction, cushion and cover – and at low volume cost. PELLETEX ease of handling and processing, with high loading capacities, make it first choice among compounders throughout the entire mechanical rubber goods field.

PELLETEX is the one black on the market able to give all types of belting rubber compounds the necessary qualities for long-lasting, dependable service. Ask for PELLETEX.

The GENERAL ATLAS Carbon Co.

CABOT

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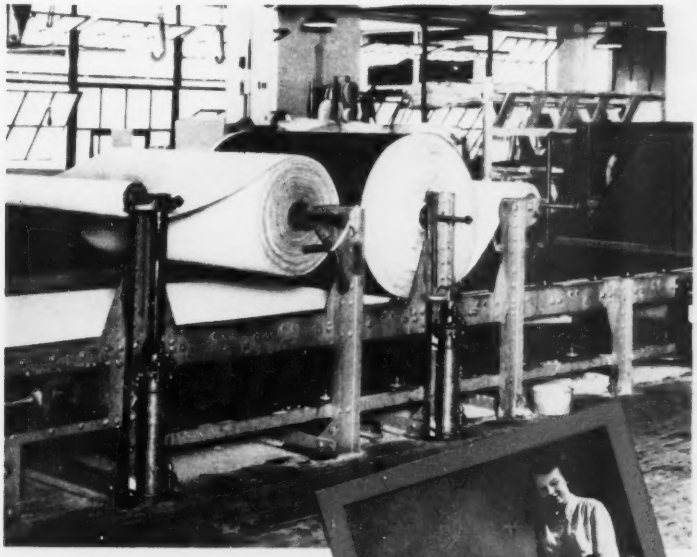
There's an easier way
to separate SHEET or SLAB stock
and lots healthier, too!
"AQUAZINC" IS YOUR ANSWER!
Using elephants to pull sheeted stock apart would be novel — but using Aquazinc to *keep* it apart is lots smarter! Highly concentrated zinc stearate solution — Aquazinc is applied as a spray or dip — eliminating the health and explosion hazards of dusting — the need for liners or cushions. Developed especially for sheet-mill or slabbed stock, Aquazinc lubricates too, giving you a smooth-flowing stock plus perfect tack control. It is readily absorbed, without affecting the stock — leaves a glossy, non-greasy finish that adds appearance-appeal. Let us send a sample of Aquazinc to try in your own plant.
BEACON
PURITY-UNIFORMITY-DEPENDABILITY
Chemical Industries, Inc.
BOSTON 30, MASSACHUSETTS

UNIFORMITY
Makes the Big Difference in INDUSTRIAL *Fabrics*

MT. VERNON FABRICS

Give You Greater Fabric Uniformity



TESTING STRENGTH AND ELONGATION OF YARN WITH MOSCROP TESTER. This unit automatically tests 6 strands of yarn at one time. One of a series of comprehensive laboratory controls throughout production to assure fabric uniformity in all Mt. Vernon-Woodberry products.

The greater uniformity of Mt. Vernon fabrics means *consistent* quality in your finished products — smoother, more efficient fabrication.

AT YOUR SERVICE

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Get a good sniff...

DU PONT ALAMASK ODORANTS GIVE
TRADE MARK
RUBBER PRODUCTS THE SNIFF THAT SELLS!

Customer appeal comes naturally to rubber products when you use "Alamask" odorants . . . "Alamask" makes that important difference, the *sniff that sells!*

Here are just a few successful end uses of "Alamask" odorants:

Rug underlays: "Alamask" ND, "Alamask" AO

Foamed sponge pillow and mattress stock: "Alamask" O, "Alamask" OS

Shoe adhesives, from natural or synthetic latices: "Alamask" ND, "Alamask" BG, "Alamask" AF

Rug backings: "Alamask" LD, "Alamask" ND

Natural smoked sheet: "Alamask" O

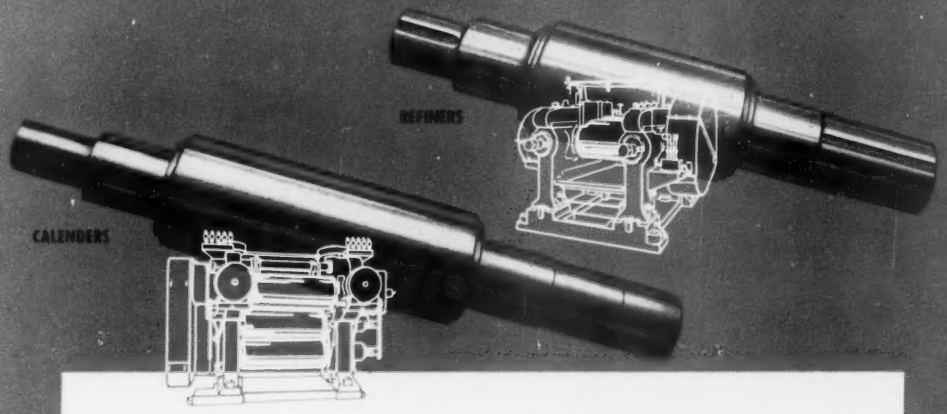
And this is just a part of the information contained in our booklet . . . "Odorants for the Rubber Industry." Send for your copy today . . . or let us give you our recommendation for your individual problems. Write E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Aromatics Section, Wilmington 98, Delaware. Branch Offices: Atlanta, Boston, Charlotte, Chicago, New York, Philadelphia, Providence, San Francisco.

Du Pont **Alamask** odorants
TRADE MARK

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

ROLLS—"custom-made" for your machines

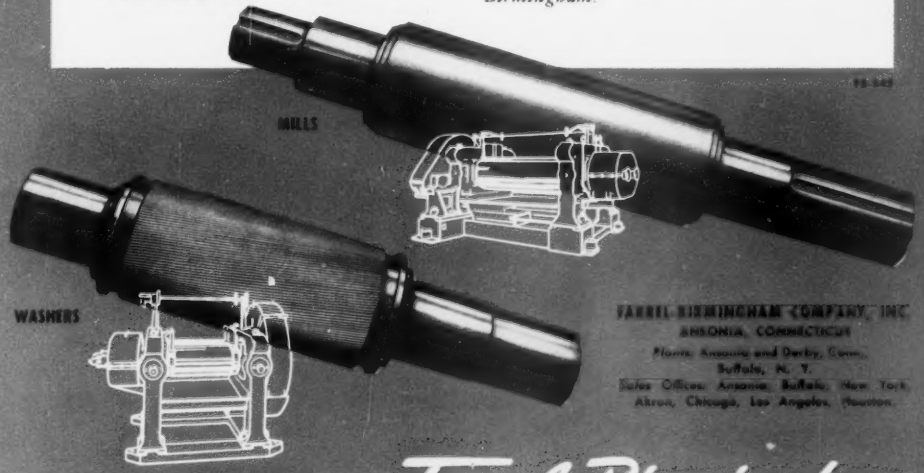


The ability of Farrel-Birmingham to produce rolls to meet your needs exactly results from a century of service to the rubber industry.

Experience in building a wide variety of roll-equipped processing machines guides company engineers in selecting the proper metal mixture . . . in determining the best method of heating or cooling the roll uniformly . . . and in designing the roll to withstand the punishment it will receive in service.

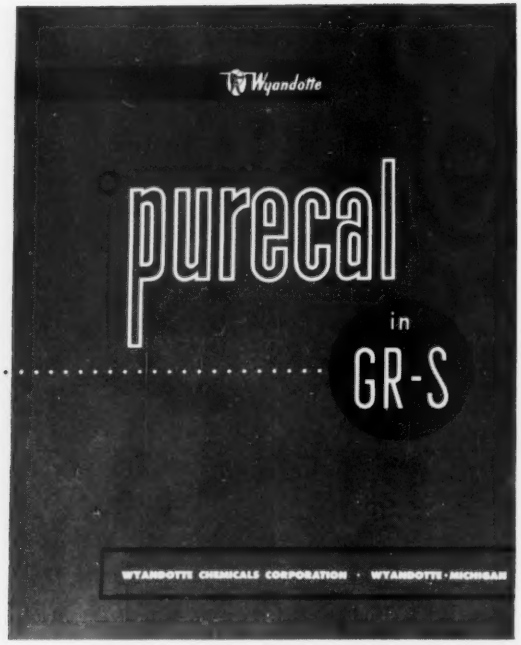
Farrel-Birmingham rolls are produced in the *world's largest specialty roll shop* at Ansonia—a shop equipped to make rolls of any size required, and in many different metal formulas, of chilled iron, alloy iron, gray iron, Meehanite metal or steel. Here, each step in manufacturing is closely controlled, from metallurgical analysis of raw materials to final inspection of the finished roll.

When you need roll renewals or other processing equipment, call Farrel-Birmingham.



FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn.; Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Farrel-Birmingham



this book printed on paper coated with PURECAL-M

See this new booklet for savings with GR-S

Chances are you've got GR-S on your mind. Well, that's what this new booklet is all about. It's titled "Purecal in GR-S" . . . it's a complete discussion of Purecal* and other non-black fillers in GR-S, compared with carbon blacks.

It gives you the facts on a new GR-S base compound of carbon black quality that can be made with Purecal. And it tells the story of the advantages of this new compound. This booklet is a working tool that offers basic information on the compounding and processing of Purecals in GR-S and cold rubber.

"Purecal in GR-S" is hot off the press and it wouldn't be a bad idea to write for your copy soon.

* *Trade Mark*

SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE
HYDROGEN • DRY ICE • SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE • PROPYLENE
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what's cooking

An Improved Product or a Brand New One . . .

If it takes rubber or plastics processing "know-how", we can be of help

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- Mills
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- Crackers
- Washers
- Rubber Sheeting & Coating Calenders
- Plastic Film Calenders
- Complete Calender Accessory Equipment
- Embossing Calenders
- Pot Heaters
- Vulcanizers
- Autoclaves
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- Automatic Curing Presses
- Belt Curing Presses
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- Auxiliary Equipment

WE can develop efficient, economical production processes and equipment to meet your requirements. We believe that we can help *you* because during the past 60 years, we have been rendering similar creative engineering services to the rubber and plastics industry the world over.

Whether you need complete processing trains embracing radically new and unusual equipment, or merely improvements in conventional equipment, our engineers will work with you or for you to your complete satisfaction.

Why not call us? You will in nowise be obligated.

ADAMSON UNITED COMPANY

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Subsidiary of UNITED ENGINEERING AND FOUNDRY COMPANY

Plants at Pittsburgh, Youngstown, New Castle, Youngstown, Canton

HERECROL

REG. U. S. PAT. OFF.

SYNTHETIC RUBBER

PRODUCTS

Illustrated are various items molded from HERECOL, the new high grade synthetic rubber developed in our laboratory since 1942 and covered by several United States Patents.

HERECROL possesses high tensile strength, outstanding abrasion, solvent, oil and chemical resistance.

All molded products are custom processed to the customer's specifications and requirements based on the ultimate use.

HERECROL molded products can be used continuously at temperatures up to 225 F. and intermittently up to 300 F. They will also withstand temperatures of —40 F.

Molded compounds are available which will meet various AMS, Federal and Military specifications.

A HERECROL molded product to suit your needs can be designed by our technical and engineering department.

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Manitowoc, Wisconsin

Use United Blacks

UNITED CARBON COMPANY, INC.

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WEST VIRGINIA

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DIXIE 60 RF

DIXIE 60 RF

IXIE 60 RF

DIXIE 60 RF

REINFORCING FURNACE BLACK

Dixie 60 (an R F black) is an extraordinarily good black because of the way it is made and what it can do. Created from a particular oil and under controlled heat and reactions in our own furnace process, Dixie 60 is fitted for easy and efficient processing, fast extrusion, less nerve, proper smoothness, tight cure, mighty reinforcement, high electrical conductivity and superb resistance to wear and flex crack cut-growth. Standardize on Dixie 60 to give your products the supremacy they deserve.

UNITED CARBON COMPANY, INC.

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CANADA, CANADIAN INDUSTRIES, LIMITED

Reinforcing Plasticizers for FAST MIXING — EXTENDING — LOW COST —

RESINEX:

A low-cost, dark-colored polymerized aromatic resin in flake, solid or liquid form that improves properties of cured compounds . . . it gives better pigment dispersion with smoother stocks . . . It will improve resistance to flex-cracking and give better tensile with improved elongation.

AROMATIC PLASTICIZER 25:

An aromatic resin, light in color, having a melting point of 25°C. Ball & Ring . . . Has same general reinforcing properties in synthetic rubber compounds as the more commonly used coumarone indenes . . . A valuable extender or replacement for other types of less available reinforcing, plasticizing resins . . . It incorporates rapidly and exhibits excellent plasticizing action.

PICCOCIZER-R

High-boiling polymerized aromatic resin in liquid form that provides excellent properties in all types of synthetic rubber compounds . . . It is light in color and can be used readily in light-colored stocks since it has no staining characteristics. It promotes rapid incorporation assuring reduced mixing time and improved processing . . .

Write for bulletins on these aromatic plasticizers. They will give you complete technical information.

HARWICK STANDARD CHEMICAL CO.

AKRON, OHIO

BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

COOKE

DISPERSED RUBBER

COLORS

give you **TOPS** in color value

Send for your copy of this color chart today.

COOKE COLORS ARE BEST BY COMPARISON

They are furnished as soft dispersions of organic toner and neutral polymer. They are unsurpassed for aging properties and will stand long storage and temperature changes. COOKE COLORS have high tinctorial value and give a clean, bright tone to the finished product.

They are quality colors for use in natural or synthetic rubber and in vinyls. They will stand all cures, are non-bleeding, and assure an *exact* color control of your products. COOKE COLORS are unmatched for depth of tone, high stability, permanence, and ease of handling.

There are over 20 standard colors in the COOKE line—a color for every job. If the shade you need is not on our color chart, the colors can be blended to achieve precisely the shade you want. Or, if you prefer, we will supply reproducible blends to meet your individual requirements.

Cooke

COOKE COLOR & CHEMICAL CO.

GLEN ROCK, NEW JERSEY

Plant and Laboratory: Hackettstown, N. J.

Tires that ride to work and play

Load the family in the car. Head for the beach, the country, or town or church . . . with never a fear about the tires. They're built to give protection for many miles of easy, economical driving. A key to dependable tire performance is the valve that *locks* the air in the tire.

Schrader supplies the kind of tire valves that do a positive air-sealing job and provide many extra qualities that result in added miles of greater safety, ease of steering and riding comfort.

A. SCHRADER'S SON, BROOKLYN 17, N. Y.
Division of Scovill Manufacturing Company, Incorporated

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FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

How temperamental can a piece of steel be?

● Plenty! Because steel is one of the most *versatile* of all materials, it can play tricks on you . . . can be mighty temperamental, even obstinate. But, properly controlled, it works for you precisely the way you want it to!

For generations, National-Standard's Athenia Steel Division has specialized in the behavior engineering of high carbon steel for the most exacting services. Here, they've learned how to take the fullest *advantage* of steel's versatility. It results in specially engineered, rigidly controlled steels that do a *better* job in all kinds of products from umbrella ribs and pen points to camera springs and piston rings.

Perhaps defense production brings you new problems in the application or behavior of steel. National-Standard and Athenia offer you the kind of engineering and development service that has speeded production and cut costs for many and many a manufacturer.

NS
NATIONAL-STANDARD Company
NILES, MICHIGAN

DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL.. *Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD.. *Niles, Mich.*	Tire Wire, Fabricated Braids and Tape
REYNOLDS WIRE.. *Dixon, Illinois*	Industrial Wire Cloth
WAGNER LITHO MACHINERY.. *Jersey City, N. J.*	Lithographing and Special Machinery
WORCESTER WIRE WORKS.. *Worcester, Mass.*	Round and Shaped Steel Wire, Small Sizes

Investigate these Qualities of

SYNTHIOL

for your Synthetic Production

Also Mfrs. of

RUBBEROL AND ***GLYCERIZED LUBRICANT***

INTERNAL LUBRICANT — FOR SLAB COATING & MOLD RELEASE

QUALITY SINCE 1884

GENSEKE BROTHERS

RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street — Chicago 32, U.S.A.

Need more protection?

STABILITE*

THE ANTIOXIDANT WITH UNIQUE CHARACTERISTICS

When looking for the most economical and outstanding antioxidant for both natural and synthetic rubber, consider STABILITE, which has, combined in one material, the following characteristics:

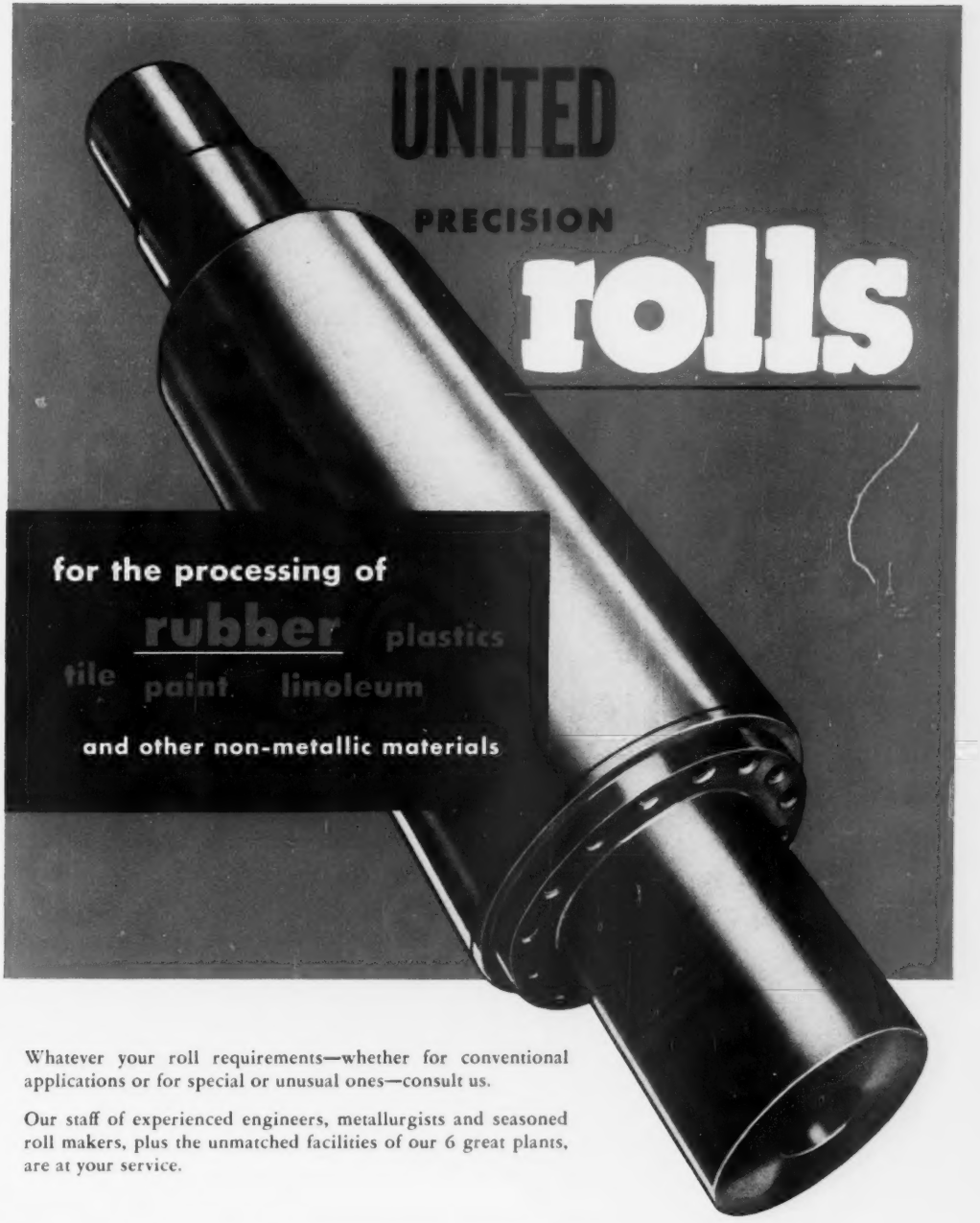
1. *Protection against oxidation and heat, sunchecking and mechanical flexing.*
2. *Distinct softening effect on uncured rubber or GR-S, resulting in better processing and dispersion, smoother calendering and tubing and at the same time without effect on modulus at cure.*
3. *The unique property of increasing the effect of most commercial antioxidants when used in conjunction with* STABILITE. *The effect of such mixtures is greater than the components.*

For the protection of your rubber products use STABILITE; for maximum resistance to oxidation, heat, sunchecking and mechanical flexing replace part of your present antioxidant with STABILITE.

*MANUFACTURED BY CHEMICO, INC.
THE C. P. HALL CO. *Manufacturing Agents*

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON, OHIO • LOS ANGELES, CALIFORNIA • CHICAGO, ILLINOIS • NEWARK, N. J.



Whatever your roll requirements—whether for conventional applications or for special or unusual ones—consult us.

Our staff of experienced engineers, metallurgists and seasoned roll makers, plus the unmatched facilities of our 6 great plants, are at your service.

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

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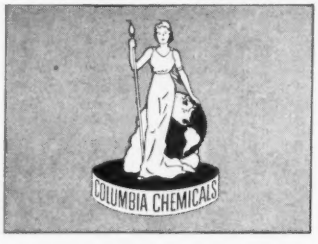
Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

Now serving your needs as

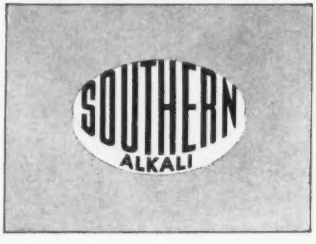
COLUMBIA-SOUTHERN CHEMICAL CORPORATION

You've known these familiar trademarks...

COLUMBIA CHEMICALS



SOUTHERN ALKALI



NOW look for THIS TRADEMARK to assure the same high quality in alkalies and related chemicals . . .

A wholly-owned subsidiary of
PITTSBURGH PLATE GLASS COMPANY

You can rely

on the same experienced organization

Whether you've been accustomed to doing business in the past with Columbia Chemical Division of Pittsburgh Plate Glass Company, or with Southern Alkali Corporation, you'll continue to find the same competent personnel—in every department—welcoming the opportunity to serve you as Columbia-Southern . . .

THROUGH STRATEGICALLY LOCATED PLANTS AND OFFICES

Production at all plants is being maintained at the highest possible levels in order to help meet the current requirements of industry.

And the same district offices will continue to provide facilities that assure the most careful attention to the needs of your business.

COLUMBIA-SOUTHERN

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

Subsidiary of Pittsburgh Plate Glass Company

EXECUTIVE OFFICES: Fifth Avenue at Bellefield, Pittsburgh 13, Pa.

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RUBBER & PLASTICS MACHINERY BULLETIN

Reporting News and Machine Design Developments

IN BUSINESS TO **NRM** REDUCE YOUR COSTS

Extruder Specifications Available

Specification bulletins on all sizes of NRM Rubber Extruders, 2½" through 12", are now available.

For copies of bulletins, specify sizes of extruders in which you are interested, and write Rubber Machinery Division, National Rubber Machinery Company, Akron 8, O.

Specifications cover Extruder construction, screw speeds, recommended motor drive, and include piping and floor plan drawings.

New MIL-X-TRUDER eliminates warm-up mill

A new development from the NRM laboratories permits recirculation of stock in the Mil-X-Truder, eliminating the additional milling formerly done on the warm-up mill. Elimination of the warm-up mill and labor for its operation, and reduction of maintenance and floor space requirements will materially reduce extrusion costs.

Stock can be fed to the Mil-X-Truder in the form of pelletized stock, stripped direct from the roll-out mill, or strip-fed at room temperature, with equally satisfactory results.

Many materials difficult to extrude such as Silastic compounds can now be fed hot or cold to a Mil-X-Truder. Commercial accuracy can be maintained on sticky materials and asbestos loaded materials. Neoprene, Buna and Butyl are brought into the class of standard extrusions by this equipment.

SZEGVARI ATTRITOR REDUCES COSTS; HAS REVOLUTIONIZED GRINDING PROCESSES

The Szegvari Attritor was developed by pioneers in latex processing. This new fine grinding machine makes conventional equipment obsolete—both by production and mechanical operation standards. Unlike conventional grinders, the Attritor has a stationary grinding tank instead of bulky rotating cylinders. Grinding elements and charge are intimately mixed together and exposed to controlled agitation by an especially designed agitator.

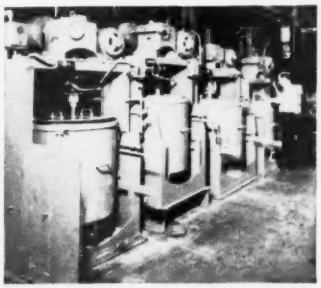


Photo: Courtesy American Anode, Inc.

Szegvari Attritors are built by NRM for the Union Process Co., Akron, Ohio—Specialists in grinding equipment. This battery of four Attritors has been in operation over a period of years grinding almost all ingredients used in rubber processing—including vulcanizing agents, color pigments, etc.

The Szegvari Attritor is small, but output is large. An Attritor requiring floor space of only 55" x 77" can produce as much as 20 times faster, with finer size, than conventional grinders. No elaborate mountings or foundations are necessary.

Greater safety in grinding hazardous material is another Attritor "plus". Reason: The volume of active grind in the Attritor is small and there is *no mechanical action in the air space* above the grind. Also a jacketed tank gives accurate temperature control. Rapid charging and discharging of the Attritor is achieved by a built-in pumping system.

MANPOWER SAVED WITH AUTOMATIC BIAS CUTTER CONTROLS

No operator needed in band-building set-ups for different ply widths

With the use of NRM's fully automatic bias cutter controls, no operator is needed in band-building set-ups, which require cutting one width for a period of time, then changing to another width for a similar period.

Manual operation can be used where desired for abnormal conditions, and service personnel can check the cutter occasionally. However, the cutter will operate as long as the cut stock is being removed from the bias cutter table. An auxiliary device accurately positions the stock in line with the splicing take-off for maximum splicing efficiency.

Ply widths are gaged and controlled directly by two photo-electric cells, mounted on the cutter bar. The width being cut is indicated on a large, easily read scale. Handwheel adjustment of ply width can be made from either side of the cutter.

A control station mounted on the side of the cutter provides for complete control of all electrical equipment: cutter motor, and let-off motor. A main control panel houses the control elements.

The table is driven by a special motor.

CUTTING SPEEDS

Range of ply widths	Max. cuts per minute
10" to 24"	20
24" to 36"	18
36" to 48"	15

The handwheel normally used for final determination of width is equipped with a clutch to permit disengaging the handwheel for automatic operation.

Your present cutters can be converted for fully automatic operation by the addition of NRM's electronic equipment, a knurled table drive roll with integral drive sprockets, a self-leveling high festoon, and separating rolls to open a space between plies for photocell operation.

Angles from 45° to 90°, and ply widths from 10" to 48" are permitted with the standard arrangement. Greater widths can be accommodated with less angle adjustment.

NATIONAL RUBBER MACHINERY CO.

General Offices & Engineering Laboratories
Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EUROPE Rubber Machinery: GILLESPIE & COMPANY
96 Wall Street, New York 5, N. Y.

Creative Engineering

AZO-ZZZ-55
zinc oxide

AZO ZZZ-55

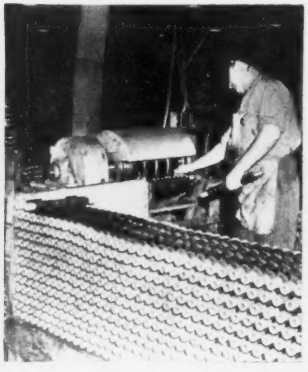
Uniform particle size and absence of extreme "fines" assures good dispersion and easy processing.

* **AMERICAN ZINC SALES CO.**

Distributors For

AMERICAN ZINC, LEAD & SMELTING CO.
COLUMBUS, O. CHICAGO
ST. LOUIS, MO. NEW YORK

THE FIGHTING MACHINE. Tanks of this type are equipped with track pins of the type shown at the left.



THE BRUSHING MACHINE. Molded track pins are fed in one at a time. An Osborn Disc-Center Wire Wheel Brush meshes with each of six sections where flash and film are to be removed. Areas are cleaned thoroughly in a few seconds and pin is discharged.

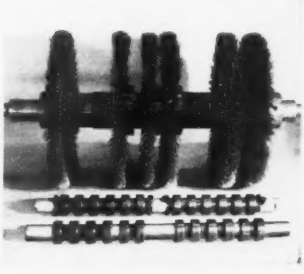
What plays clean-up on the rubber-steel team?

...a brush! These are track pins of army tanks. Here, rubber "tires" are bonded to steel pins to produce strong, quiet-operating parts for the rigors of tank warfare.

The problem was to remove the rubber flash and film from six bearing and electrical-ground sections of the pin after molding. With the help of the **O**sborn **B**rushing **A**nalyst, a machine with six Osborn Disc-Center* Wire Brushes was devised to remove the excess rubber from all six areas simultaneously . . . in a matter of seconds.

Throughout all industry, Osborn power brushes are simplifying cleaning and finishing operations and improving products of every description. Here's how an **O**sborn **B**rushing **A**nalyst can help you. Call or write, *The Osborn Manufacturing Company, Dept. 536, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

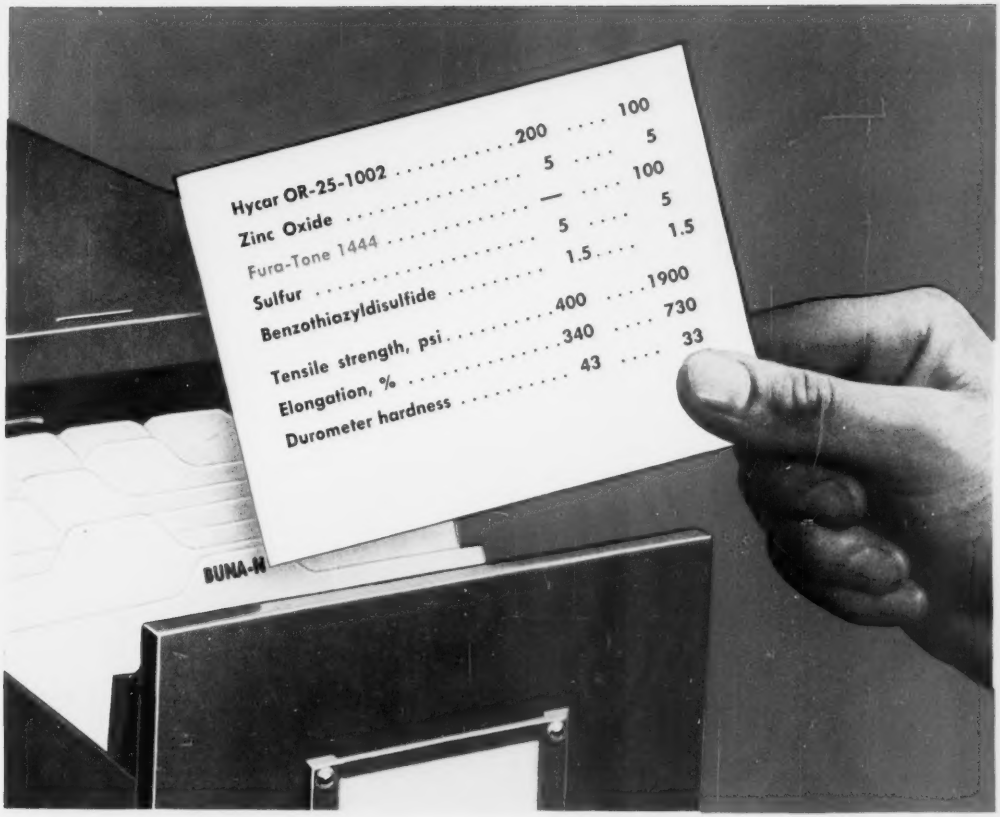
* Trademark



THE BRUSH SET-UP. This photo shows construction of arbor with six Osborn Brushes spaced to fit into track pin grooves where rubber is to be removed. In the foreground are track pins before and after brushing.

OSBORN

LOOK FOR THE NAME OSBORN...RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS


Hycar OR-25-1002 ..... 200 100
Zinc Oxide 5 5
Fura-Tone 1444 ..... — 100
Sulfur 5 5
Benzothiazyldisulfide ..... 1.5 ..... 1.5
Tensile strength, psi 400 1900
Elongation, % 340 730
Durometer hardness 43 33
BUNA-N

Strength and elongation go way, way UP when FURA-TONE® 1444 is used in Buna-N stocks

. . . AND HARDNESS GOES DOWN AT THE SAME TIME! Just compound your Buna-N stocks with this radically new reinforcing resin—Fura-Tone 1444—and note the remarkable increases in both tensile strength and elongation—*along* with reductions of 10 points or more in durometer hardness. *There's no need to add carbon black to obtain the above physical properties.*

Fura-Tone 1444 improves processing properties *too* . . . and imparts added tack to Buna-N stocks. It also increases resistance to petroleum solvents and to ozone.

Its low cost substantially cuts down the cost-per-volume of the finished stock. And . . . it's available right now in any quantities you want!

For detailed technical data, send this convenient coupon now.

Chemical Division

Irvington

VARNISH & INSULATOR COMPANY

6R Argyle Terrace, Irvington 11, New Jersey

Plants: El Monte, California Hamilton, Ontario, Canada

IRVINGTON INSULATION

Irvington Varnish & Insulator Co.
Chemical Division • 6R Argyle Terrace
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RA-9-51

Gentlemen:

Please send me your Technical Data Sheet on Fura-Tone 1444.

Name..... Title.....

Company.....

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City..... Zone..... State.....

STABILIZE YOUR PRODUCT WITH RECLAIMED RUBBER

U.S. RECLAIMS HELP MAKE CONVEYOR BELTS TOUGH! . . . TRANSMISSION BELTS STRONG!

Toughness, flexibility and resistance to abrasion . . . all properties that spell long life for conveyor and transmission belts, are retained when you use a substantial percentage of U.S. Reclaims in your friction and cover stocks. AND . . . you'll be greatly extending your limited supply of crude rubber.

In addition, the new dip-process U.S. Reclaims will help improve your processing and lower your compound costs. Let us suggest the proper U.S. Reclaims to meet *your* special requirements.

Manufacturers everywhere realize that through the years, the constant fluctuation of crude rubber prices and availability have made it virtually impossible to maintain their quality and production standards. Most of them, however, have now discovered *the great stabilizer* . . RECLAIMED RUBBER; and always keep a goodly percentage of reclaim in their formulae.

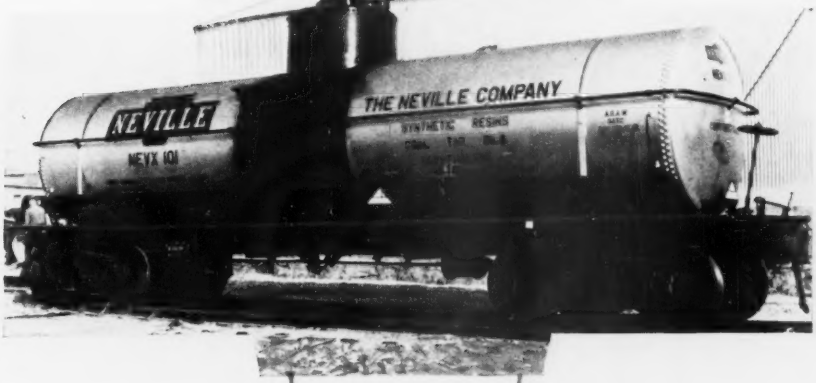
No matter what you make out of rubber, there is very probably a U.S. Reclaim that will help you STABILIZE your product and MAKE YOUR NEW RUBBER GO FARTHER.

Always keep reclaims in your formula and always look to U.S. for the best. U.S. Rubber Reclaiming Company, Inc., P.O. Box 365, Buffalo 5, N. Y. Trenton agent: H. M. Royal, Inc., 689 Pennington Ave., Trenton, N. J.

68 years serving the industry solely as reclaimers

U.S. RUBBER RECLAIMING COMPANY, INC.

from OUR PLANT to YOURS



Behind Neville's quality of production is a distribution system that goes hand in hand with its expanding manufacturing facilities. With main plant located in the heart of the industrial East and with a branch plant in fast-growing Southern California, Neville customers are assured the fastest possible service, whether the order leaves the plants in drums, tank-transports or by tank-car!

THE NEVILLE COMPANY NEVILLE **PITTSBURGH 25, PA.**

Plants at Neville Island, Pa., and Anaheim, Cal.

RESINS—COUMARONE-INDENE • MODIFIED COUMARONE-INDENE • PETROLEUM • ALKYLATED PHENOLS
OILS—SHINGLE STAIN • NEUTRAL • PLASTICIZING • RUBBER RECLAIMING • CREOSOTE
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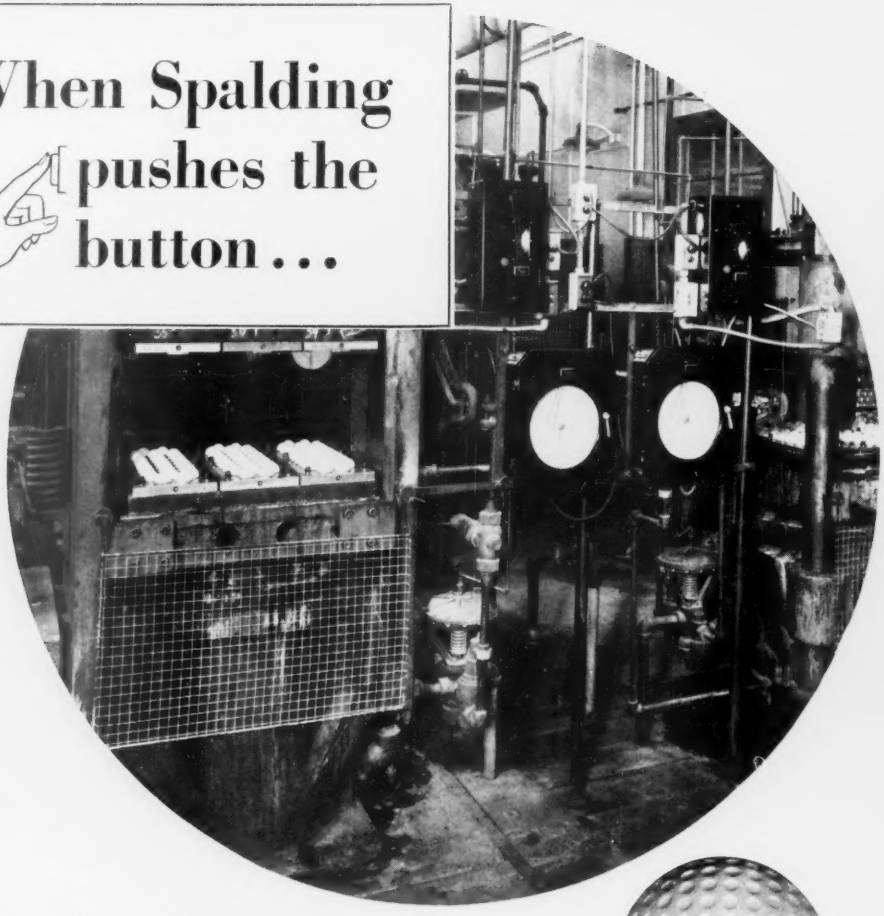
SPECIALTIES—PHENOTHIAZINE • RUBBER COMPOUNDING MATERIALS • TAR PAINTS

A-41

When Spalding pushes the button...



...Taylor keeps its eye on the ball!

Taylor's Centennial ACCURACY FIRST SINCE 1851

WHEN the A. G. Spalding Company cures golf balls at its Chicopee Falls, Mass., plant, they start each press by pushing just one button. From then on, a Taylor FLEX-O-TIMER* Time Cycle Controller takes over and regulates the sequence and duration of all press operations. Here's what happens:

1. Hydraulic valve opens, applying pressure to close press and hold it closed.

2. Simultaneously, steam is turned on for heating press platens, and timing of curing cycle begins.

3. At end of timed curing cycle, timer shuts off steam and opens water valve to cool platens.

4. At end of cooling cycle, water is shut off, hydraulic pressure valve is closed and press opens.

5. Throughout entire process, a Taylor Two-Pen Recorder makes permanent chart record of both platen temperature and platen pressure.

Result for Spalding: identical cures, time after time, with minimum rejects, minimum operator attention . . . a tremendous saving in time and money.

Taylor Instruments can keep an eye on quality for you too. There are FLEX-O-TIMERS to handle as many as 18 functions, and control instruments for any process variable. Ask your Taylor Field Engineer, or write: Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

*Trade-Mark

• • •

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow, liquid level, load, speed and density.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

a year later. . . .

ANTIOXIDANT 2246

is still "Better than the Best"

Antioxidant 2246 is the most active non-staining, non-discoloring antioxidant that has been developed to date.

Antioxidant 2246 shows the lowest net cost for equivalent or better aging qualities than any other product of this classification now on the market.

Write today for Calco's technical bulletin which gives complete information on this proven product.

Calco®

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION

INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT

BOUND BROOK, NEW JERSEY, U. S. A.

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby and Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. St. Lawrence Chemical Company, Ltd., Montreal and Toronto

ANTIOXIDANT 2246

a year later

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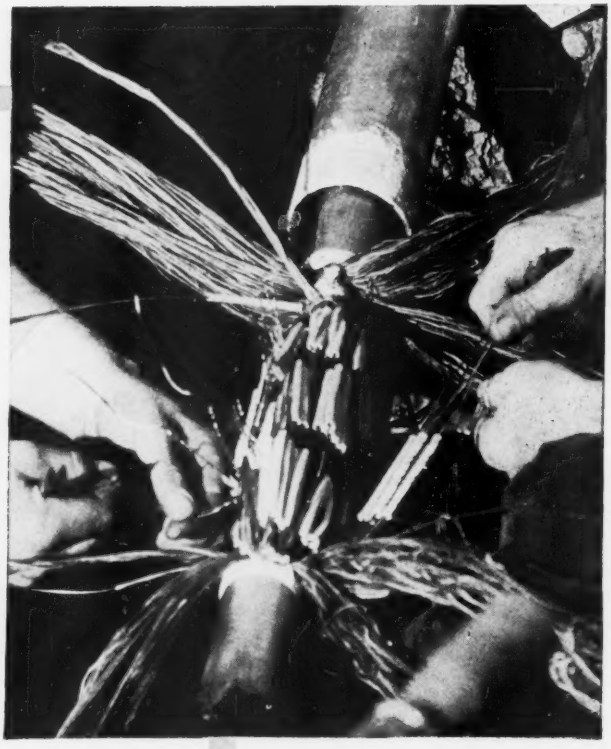
FOR QUICK, LASTING *Identification* ...FULL ELECTRICAL PROTECTION



The ever increasing complexity of electrical and electronic equipment makes fast, accurate, lasting identification of circuits essential.

White and tinted insulations of latex, vinyl or polystyrene are greatly improved through the use of TITANOX pigments. TITANOX-RA, for example, is not only compatible with all the above compounds but imparts exceptional whiteness or increased opacity which yields bright, clear tints. Furthermore, TITANOX pigments, because of their stability and dielectric characteristics, contribute to the electrical value of the insulation.

Our Technical Service Department is always available to help you with your problems in pigmenting all types of natural and synthetic polymers. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 1; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Ltd., Montreal 2; Toronto 1.

3749

® **TITANOX**

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

TITANOX

Triple Victory

IN MACAULAY'S FAMOUS POEM, Horatius stood before the narrow bridge to Rome and saved the city by slaying Lars Porsena's three ablest warriors.

Now, no one's going to write poetry about IONOL® . . . the antioxidant that is proving so successful in rubber goods manufacture . . . but there *is* a parallel!

IONOL, too, is a determined fighter of three tough aggressors—oxidation . . . staining . . . discoloration of quality rubber products. This tri-substituted hindered phenol retains its effectiveness through long exposure to light, air and heat . . . even when copper salts are present. Because of its triple action against oxidation, IONOL contributes longer life and better performance to rubber products.

While the demand for IONOL currently exceeds production capacity, it will pay you to give serious consideration to its advantages in your product development planning.

IONOL IS ALREADY IMPROVING THESE:

Pressure sensitive tape • Asphalt and rubber tiles • Drug sundries
Rubber coatings for wire • Light-colored extruded specialties
Swimming accessories • Play shoes

SHELL CHEMICAL CORPORATION

CHEMICAL PARTNER OF INDUSTRY AND AGRICULTURE

Eastern Division: 500 Fifth Avenue, New York 18, N. Y.
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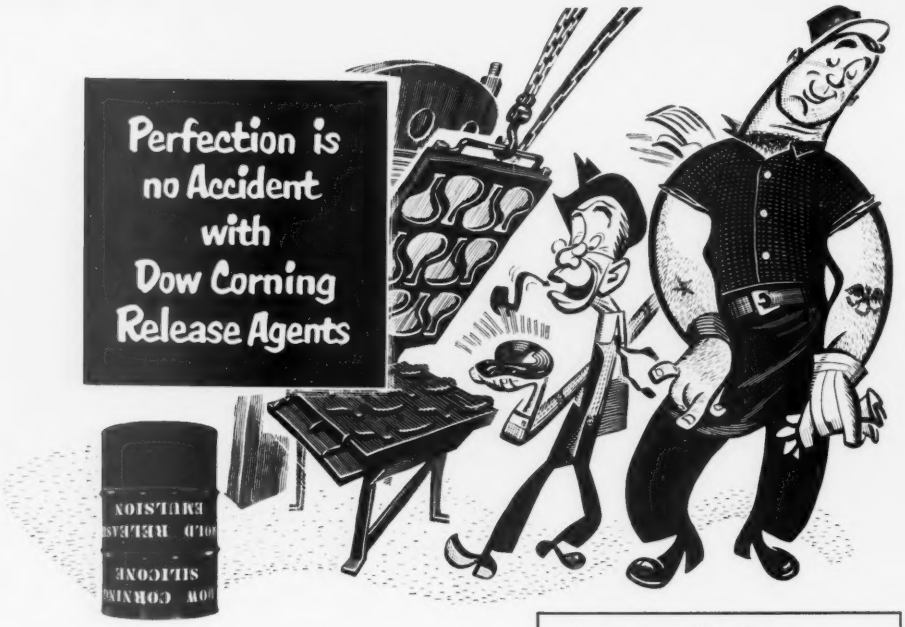

Now you can buy precision molding and high surface finish by the drum! And what's more, those drums of Dow Corning Silicone mold lubricants also reduce scrap to the vanishing point—cut your mold maintenance costs by as much as 80%. Clean molds stay cleaner longer and you get easier release of tires and parts with uniformly sharp detail and a high surface finish, free from blemishes, inside and out.

That's why pressmen, production managers, quality control and sales departments all call for Dow Corning Silicone release agents; Emulsions for molds and curing bags; Mold Release Fluid in a solvent solution for green carcasses and for bead and parting line release.

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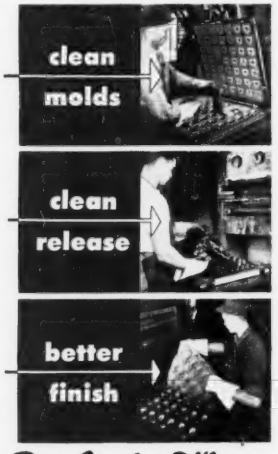

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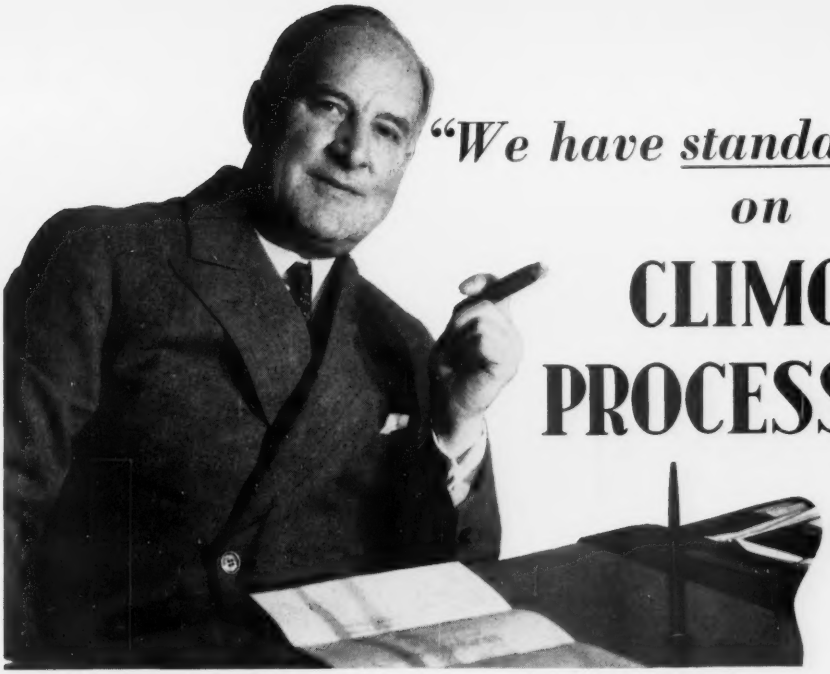

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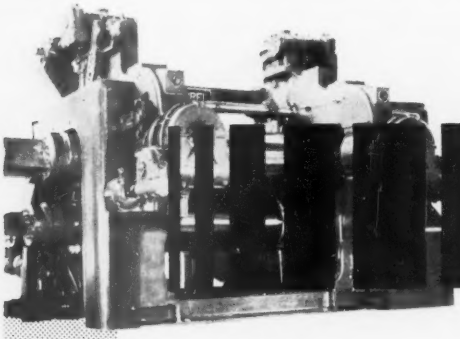

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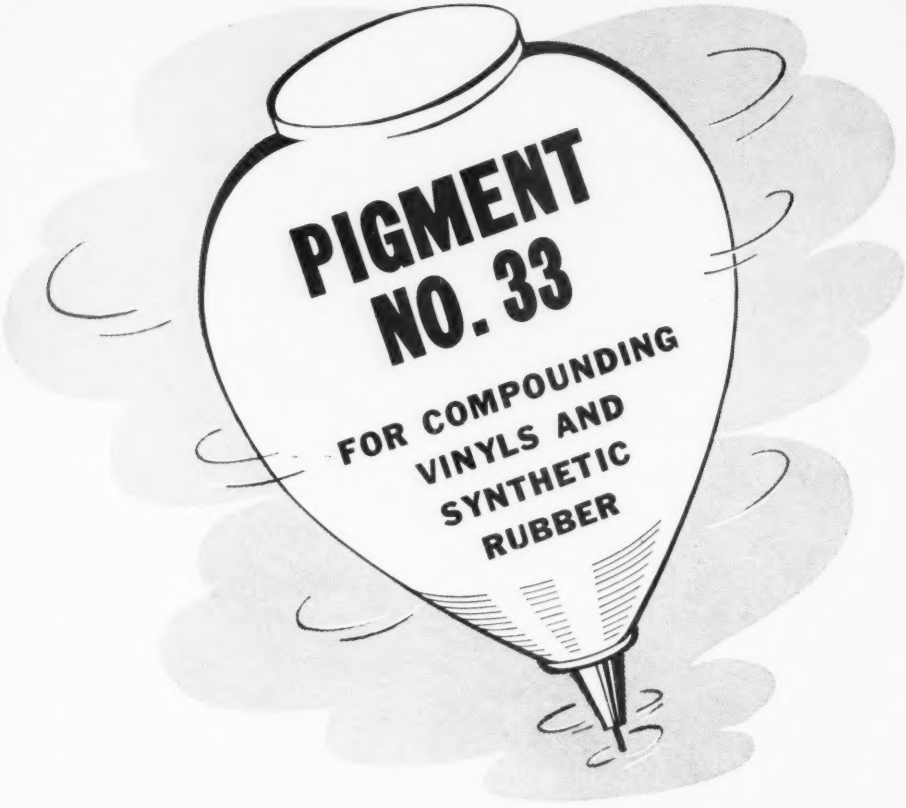

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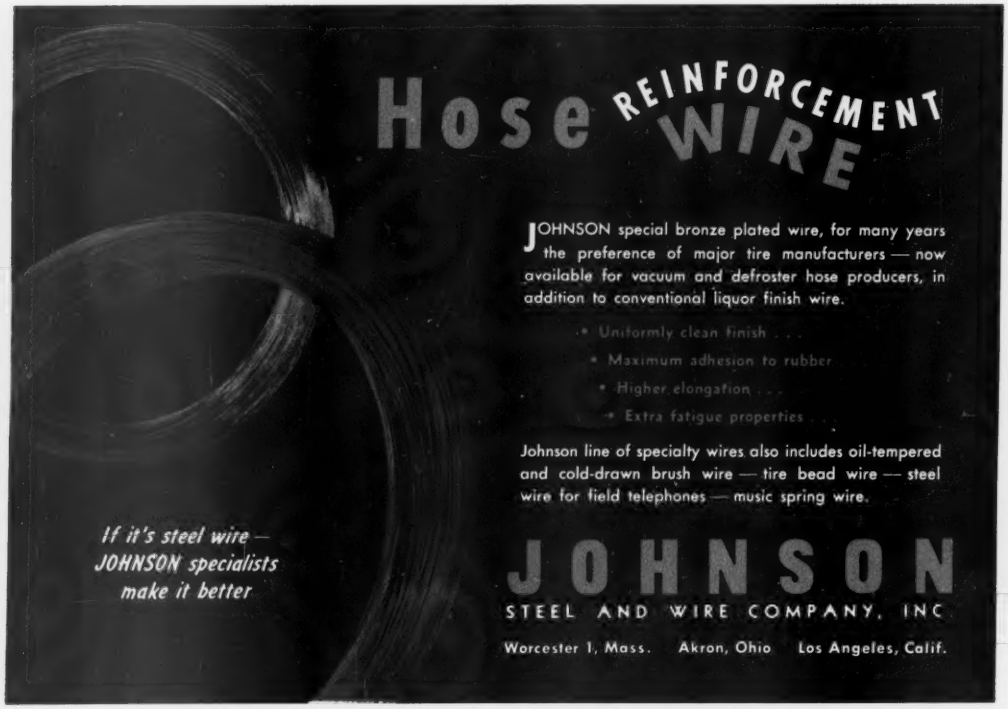
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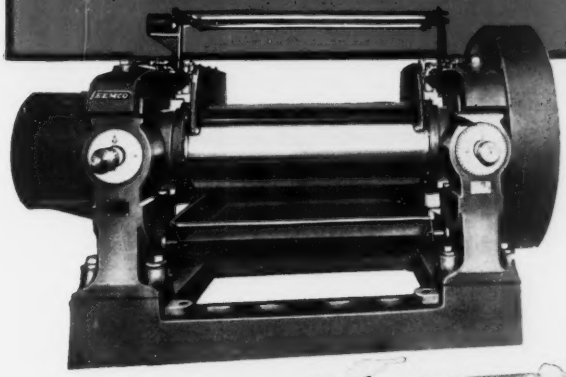

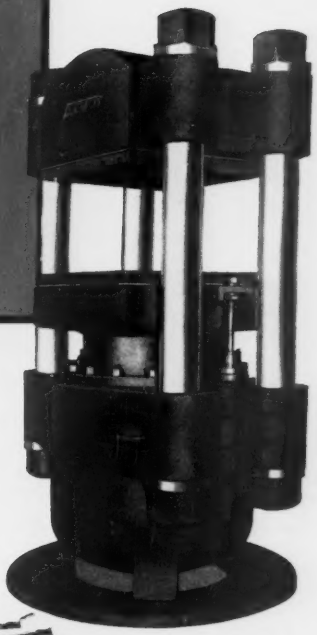

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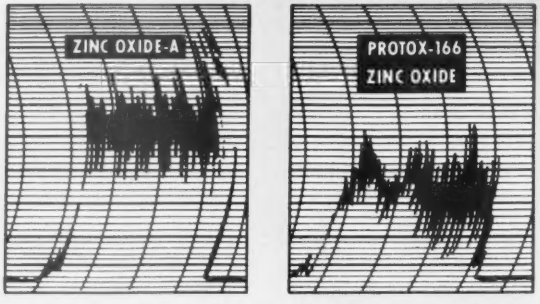
A supplement to THE ACTIVATOR—the house organ issued by The New Jersey Zinc Company for over 15 years to aid the Rubber Industry in its use of Zinc Oxide.

Plasticizing Action of PROTOX ZINC OXIDE *SPEEDS PROCESSING of* BUNA-N

POWER CONSUMPTION CHARTS OF BUNA-N MASTERBATCHES



Conventional zinc oxide resists wetting by Buna-N and other high-Mooney polymers.

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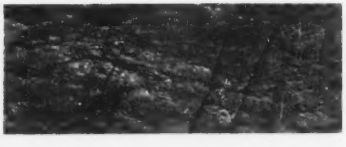
*U.S. Patents, 2,303,329 and 2,303,330

ZINC OXIDE DISPERSIONS IN BUNA-N MASTERBATCHES

Zinc Oxide-A—Untreated zinc oxide disperses quite effectively in Buna-N, but still shows some aggregated pigment in this short mixing cycle.



Protox-166—This pigment disperses in Buna-N more completely than any other oxide, because of its zinc propionate coating.

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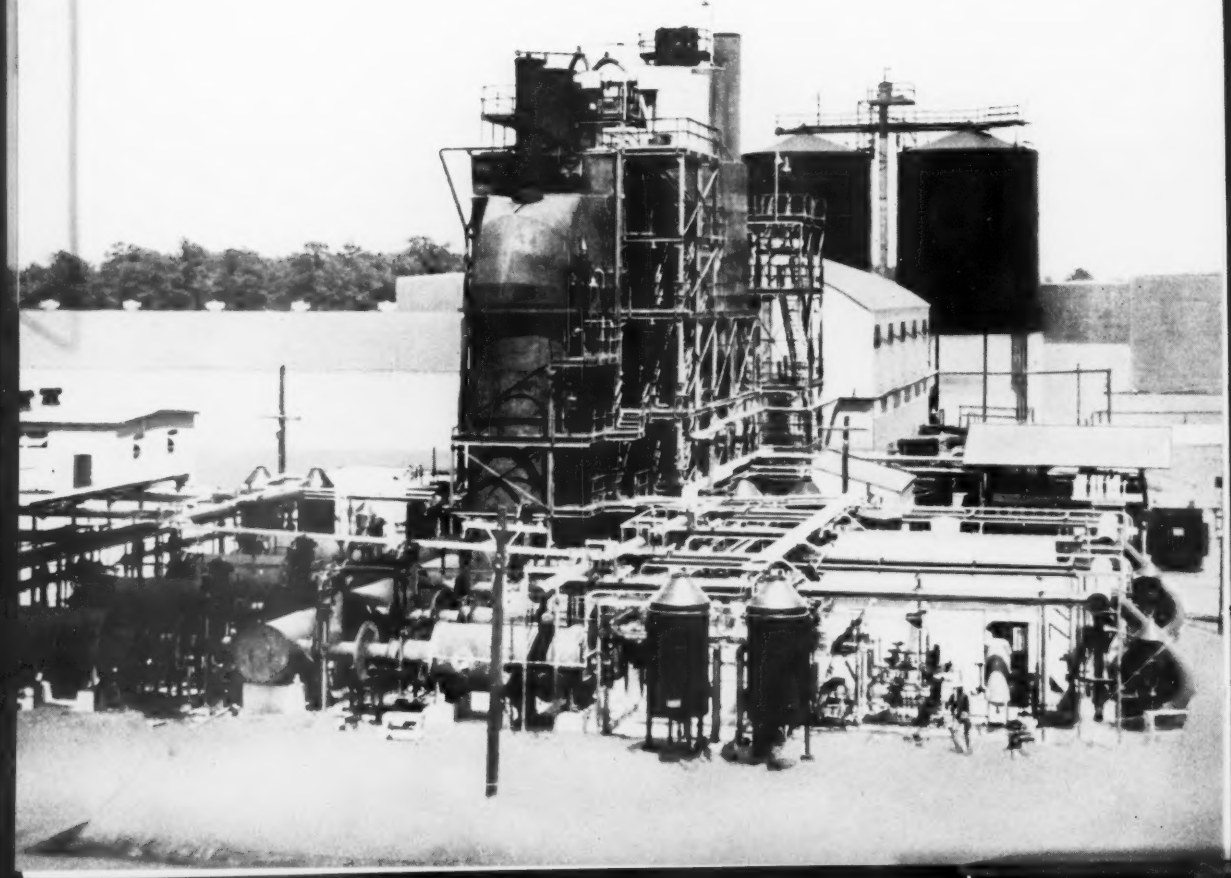

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RUBBER AGE

Vol. 69. No. 6 SEPTEMBER, 1951

The Rheology of Rubber Solutions and Suspensions

I—Rubber-Solvent Systems

By LOUIS LEAMAN

Magic Chemical Co., Brockton 2, Mass.

THE study of the rheology of rubber in solution is part of the larger aspect of rubber plasticity, structure of the rubber molecule and the properties of colloids in general. These solutions are of widespread economic importance and warrant detailed investigation. Our treatment is divided into two parts: (1) rubber-organic solvent systems and (2) rubber latex and water-dispersed systems. This division is necessary because of their entirely different colloidal properties and hence different rheologic properties.

The behavior of rubber solutions using organic solvents is typical of the class of lyophilic colloids and is analogous to the behavior of such colloidal systems as nitrocellulose in butyl acetate, gum arabic in water or polystyrene in benzene. The term "rubber" in this paper is taken to mean elastomers in general. This will be modified as necessary according to the particular type of rubber under discussion.

Practical Applications

It is the purpose of this first paper to discuss the flow properties of rubber solutions. These properties are of practical importance because a large volume of crude rubber is processed into consumer products through the medium of solutions. The rubber manufacturing industry is highly diversified. To mention just a few applications of rubber solutions, there are textile coatings, footwear, dipped articles, hose and the cementing of plies or component parts.

After mastication and compounding in a mill, the rubber or rubber compound may be further plasticized by dissolving in a suitable organic liquid. The resulting dough or cement is then utilized in appropriate machinery which takes advantage of the highly plastic nature of the solution. Upon evaporation of the solvent, the rubber solution has finished its function and the rubber compound is then in the desired form or location.

Through all these manipulations, the rubber solution will increase or decrease in viscosity and be subjected to conditions wherein the flow properties are continually altered. These rheological properties are utilized thoroughly in designing and manipulating the rubber product, and close control of flow properties is maintained. Many methods are used to alter the plastic and elastic properties of crude rubber. These methods also greatly modify solutions made from the treated rubbers and their compounds. Experimental results will later be described showing the effect of the various treatments.

When the treated rubber or compound is added to the solvent in a churn, the dissolution process first consists of a swelling of the rubber. The solvent diffuses into the solid rubber. The molecular chains are gradually separated, diffusing into the solvent, and become intimately surrounded with solvent. The end product may be a viscous dough or a thin cement, or any

intermediate type of solution. There is a complex equilibrium of plastic and elastic properties in these solutions and in their subsequent manipulations.

Place of Brookfield Viscometer

The rubber technologist recognizes the importance of the viscosity of these systems. Many instruments are available for determining viscosity and are in widespread use. Instruments are available which determine viscosity at a single concentration or single point, such as the capillary and falling ball types. Other instruments, such as the rotating cylinder, are more convenient for determining the viscosity of a system at varying rates of shear and shearing stresses. Since, in actual practice, rubber solutions are subjected to many varying mechanical stresses, the latter type has been found more useful in design of compounds and to control the engineering conditions under which they are used.

A single point viscosity determination on a rubber solution may give misleading information. The actual conditions of use may be entirely different from those of the test. It would likewise not take into account the viscosity changes under dynamic conditions. These changes are prevalent in systems such as rubber solutions.

The Brookfield Viscometer is a rotating cylinder type used in the experiments described later in this paper. Of the various commercially available viscometers this model seems to be outstanding in ease of use, reproducibility of results and general utility. Many investigators have built viscometers of their own design which are useful for some specific application.

Survey of Literature Through 1937

A study of published literature shows that from the earliest days of the industry, workers were concerned with rubber solutions and methods of modifying their flow properties. A concurrent interest was, of course, shown in methods of measuring viscosity.

Dr. W. F. Busse, in Davis and Blake's "Chemistry and Technology of Rubber," has outlined the progress in this field up to 1938 (pp. 200 to 220). Busse distinguishes between three types of rubber solutions: (1) Dilute solutions, (2) Cements, and (3) Doughs.

Dilute solutions contain rubber concentrations up to a few tenths of one percent, and are Newtonian in rheological characteristics. The viscosity is only slightly higher than that of the pure solvent. Their importance is in the determination of molecular weights and structure by the viscosity method.

Cements are solutions containing up to 10% of rubber and have viscosities up to one thousand times that of pure solvent. They may or may not contain compounding ingredients such as inorganic fillers, resins and vulcanizing agents. Due to closer crowding of rubber chains, elasticity effects cause modification of viscosity, and flow properties are non-Newtonian.

Doughs are solutions of 20 to 30% rubber, usually with added compounding ingredients of great variety. Up to 1937 no scientific treatment of their properties had appeared. Study of analogous systems in other industries have been of value.

Various types of viscosity measuring instruments are mentioned, all of which have found practical use in the rubber industry.

Most of the work done on viscosity of rubber solutions prior to 1938 was of a qualitative nature, investigating effects of various treatments. These studies established many of the procedures now regarded as commonplace by rubber technologists. The various "pure" solvents give different rheological properties to rubber solutions. Practically all the usual solvents are hydrocarbons. The addition of certain amounts of non-solvents lowers viscosity. Traces of water also have the same effect. Acids, bases, oxidizing agents and other chemicals also may cause lowering of viscosity. Light and heat are other conditions which cause viscosity changes. Most of these studies were empirical, and no exhaustive attempts were made to establish well-defined scientific rules governing these phenomena.

Many investigators studied the relation between viscosity and concentration. Being an intrinsic colloid, rubber causes rapid rise in solution viscosity with increasing concentration. Equations proposed to define this relationship seem to be valid only for low concentrations. The change to non-Newtonian behavior of rubber solutions as rubber concentration increases from low values was first observed by Kirchhof in 1914. The effect of shearing force on rate of shear was studied. At low shearing stresses there was a linear (proportional) relationship between shearing stress and rate of shear. At higher shearing stresses the rate of shear increased more rapidly than shearing force (non-proportional). Several workers suggested an internal elastic structure to account for the non-Newtonian flow. Equations derived showed a general agreement with this elasticity theory.

At the time of writing of this chapter (1937), the mathematics of visco-elastic flow had not yet been developed to the point where quantitative information could be obtained. However, the prevailing explanation was that rubber molecules in solution were kinky, flexible fibers which tended to stretch and become oriented by shearing forces. The more closely packed the fibers were, the less they were able to orient themselves. At higher shearing stresses the elastic forces are overcome more easily and the solution shows more plastic effects.

Review of Literature from 1937 to 1950

The year 1937 has been taken as an arbitrary date in this discussion because of the comprehensive treatment of the prior work by Busse. It has, of course, no other significance. Active and intensive study of rubber solutions and their rheology has continued to the present time. Outstanding developments have occurred during the past decade. These have been due largely to (1) availability of a wide variety of synthetic elastomers, giving more and varied structural "systems" to examine, (2) the incentive of creating a vital, technologically-sound synthetic rubber industry, and (3) improvements in techniques and equipment for measuring viscosity and rheological phenomena.

Viscosity studies have been widely used in the synthetic rubber program to help develop improved elastomers through knowledge of molecular structure and to find techniques helpful to the rubber-consuming industries. A number of European investigators have made several exhaustive studies on this subject. Among these may be mentioned Houwink and Klaassens and H. Eilers.

Houwink and Klaassens published a paper entitled "The Viscosity-Concentration Relationship in Concentrated Solution and Its Dynamic Significance" *(27)*. In this paper they discussed previous work by Bredee and de Booys *(9a)*. The experimental work was done on concentrated solutions of natural rubber, as well as other polymers. The size and shape of the molecules, as well as the concentration, were considered. Mathematical formulae were derived.

In 1943 H. Eilers *(15)* published the results of exhaustive studies on rubber solution viscosity, using

samples of rubber which had been masticated for various lengths of time. This paper is entitled "Viscosity-Concentration Relationship of Colloid Systems." He also correlated the results with the shapes of the polymer molecules and derived mathematical formulae for the relationships. In 1940 a paper appeared in a German journal *(5)* discussing "Factory Control in the Rubber Industry." Among the factors discussed was the testing of viscosity and its importance. Three graphs were published, as shown in Figures 1 and 2. Figure 1 shows the dependence of viscosity on concentration of rubber in solution. Figure 2 shows the dependence of viscosity on the temperature of the solution.

In the field of natural rubber, Busse *(11)* has reviewed experiments on vulcanization in solution, a very complex reaction. The progress of such vulcanizations under many conditions were studied by viscosity changes. A. W. Campbell *(12)* made a study of nitroparaffins and their derivatives as anti-gelling agents in rubber solutions. Blake and Bruce *(7)* followed the decrease in viscosity of rubber solutions caused by exposure to light and the effect of added chemicals on viscosity changes. Other investigators, Graff and Skau *(22)*, have also determined the effect of various external agents, such as light and oxygen. S. Reissinger *(31)* investigated the viscosity of rubber solutions in dipped goods manufacture. He recommended a flow test for control of rubber viscosity. He also used this test for studying the effects of compounding ingredients. He pointed out how important are flow properties in this particular manufacturing application. Zaionchkovskii *(53)* also devised a control method for determining the viscosity of rubber cements during their manufacture.

In the commercial application of synthetic rubber, work has been done on viscosity characteristics of the various available types. Evans and Young *(16)* determined viscosity figures for polybutene solutions. Concentrations of one to ten percent in sixty solvents were used. Viscosity-concentration curves were plotted. The various colloid and physical phenomena affecting viscosity and solubility were discussed. In another paper, Young and McArdle *(52)* suggested the use of the rising-air-bubble viscometer with polymer solutions.

The National Bureau of Standards has contributed to our knowledge of flow behavior of GR-S solutions. Two of the papers published in this connection were "Apparent Viscosity of 5-30 Percent GR-S Rubber Solutions" *(30a)* and "Flow Behavior of Concentrated GR-S Rubber Solutions" *(6a)*. The latter paper gave flow curves for solutions of milled GR-S in ortho-dichlorobenzene over a concentration range of 0.1 to 10.0% and developed a mathematical relationship between them.

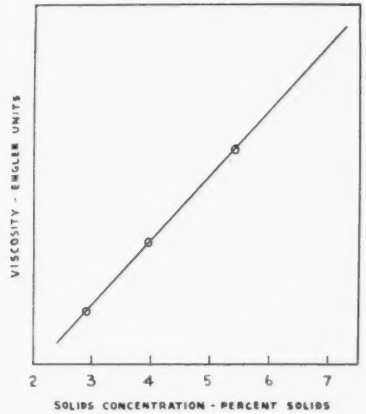

FIG. 1—Dependence of viscosity on concentration.

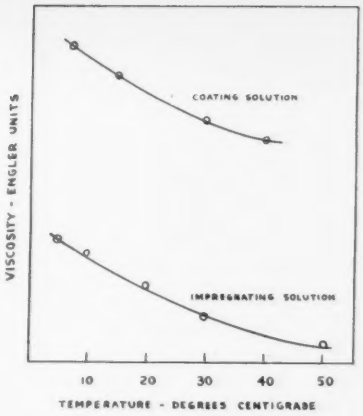

FIG. 2—Dependence of viscosity on temperature.

Evans, Young and Holmes *(17)* have studied the effects of adding polybutene to asphalt cutback solutions. This addition has the effect of increasing the viscosity of the solutions and imparting desirable flow characteristics. McArdle and Robertson *(30)* further studied viscosities of natural rubber, polybutene and alkyd resin in branched-chain hydrocarbons. A method of hydrocarbon analysis is suggested, based on the differences of solution viscosities using the same solute.

One method of attacking the problem of improving GR-S synthetic rubber has been to study the correlation between gel content of the polymer and those physical properties of interest in practical technology. "Gel" is defined as an extremely high-molecular weight fraction which is insoluble in benzene. L. M. White and coworkers *(51)* have found a definite relationship between the gel content of GR-S, its processing qualities and the physical properties of the vulcanized polymer. There is also a direct relationship to the viscosity of the benzene-soluble fraction. A. L. Back *(6)* further extended this work to show a precise relationship between gel content, plasticity and dilute-solution viscosity. This study was applied to natural rubber as well as to GR-S.

Continued studies in this field are being made. Driskell and Kracke *(13)* have published their work on "The Mooney Viscosity and Gel Plasticity Relationship for GR-S-Xylene Gels." The laboratories of the Columbian Carbon Company *(9, 42)* have applied the concept of gel content to carbon black reinforcement of GR-S and natural rubber.

Viscosity studies have likewise been used by Goldfinger *(3, 4, 20, 21)* in an extended series of investigations on the mechanism of reinforcement of rubber by pigments. In Goldfinger's initial studies a capillary viscometer was used. Later, a rotating cylinder viscometer was used, and flow curves (rate of shear vs. stress) for rubber-carbon black solutions were plotted. This type of treatment has given valuable information. Tugov and Zaionchkovskii *(47)* followed the polymerization of butadiene by changes in the viscosity of the solutions.

The viscosity properties of neoprene solutions have been extensively studied by the DuPont Company. Many reports of a practical nature have been published *(14)*. A wide variety of conditions affecting viscosity are discussed and recommendations made. The data given in these reports can form the basis for further rheological investigations. The concept of cohesive energy density is employed to evaluate proper solvent blends. A report on the properties of Buna-S cements has also been published. This report briefly mentions the viscosity of these solutions. Sarbach *(32)* has discussed the properties of Hycar (Buna-N) solutions.

The preceding paragraphs have described briefly some of the published work concerning viscosities of rubber solutions. While much of this work was not primarily designed to give rheological information, it has shown that solution viscosity is an important tool in many types of investigations on elastomers.

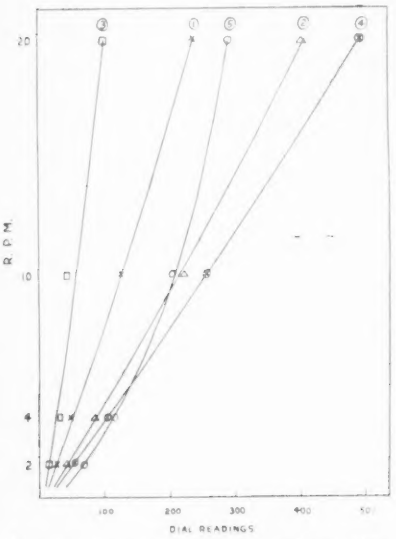

FIG. 3—Solutions of natural rubber (rpm vs. dial readings).

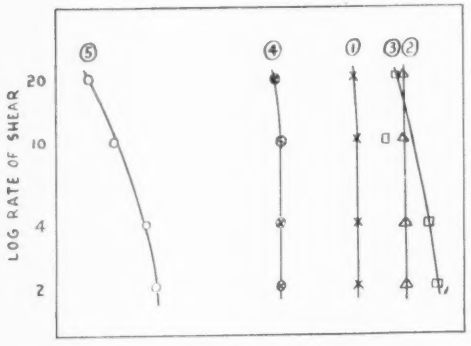

FIG. 4—Solutions of natural rubber in petroleum naphtha (log rate of shear vs. log viscosity).

The general field of rheology has made many advances during the past decade. Many of these techniques can be applied to the rubber industry and will be described here briefly.

Several types of rotational viscometers have been designed. Improvements and modifications of the basic Couette type have been made by individual research workers. The Brookfield "Synchro-Lectric" Viscometer *(10)* was introduced in 1940. This instrument is described in detail below. Green and coworkers *(23, 24, 25, 50)*, working in the printing ink industry, developed the Interchemical Viscometer. Fischer and Lindsley *(18)* have described a rotational viscometer of their own design, a modification of a commercial model. R. E. Bowles *(8)* designed a coaxial cylinder viscometer which he used in the paint industry. Such an instrument, while somewhat awkward to handle, utilized proven rheologic principles and gave results of great practical value. The Hercules Powder Laboratories *(40)* have developed a rotational viscometer with automatic recording attachment. The Brookfield Engineering Laboratories have also developed an automatic recording attachment for their viscometer. Wagner and Russell *(49)* developed a capillary tube viscometer for routine molecular weight determinations which is much easier to operate than the conventional Ostwald pipette.

The same laboratories *(48)* developed other interesting instruments for measuring rheological properties of elastic and viscous liquids. This is done by determining resonance frequencies and maximum amplitude of oscillation of a cylinder set concentrically within another, between which the liquid is placed. Viscometers for continuous and automatic measurement of viscosity in manufacturing and chemical engineering operations are also available. Among these is the Brookfield "Viscotrol."

Extended programs of research in industrial rheology have been reported in several fields. For example, there are the researches of Traxler in the asphalt industry *(29, 43, 44, 45, 46)*, Green in the printing ink industry *(23, 24, 25, 50)* and Scott-Blair in the dairy and food processing industries *(33-39)*. Traxler has conducted fundamental studies in the rheology of asphalt and asphalt compounds. Several types of viscometers have been used, some of his own design. Recently, a paper has been published describing the results with the Brookfield Viscometer *(29)*.

The main effort has been to find the fundamental theoretical principles explaining the empirical tests and observations used in the manufacture and applications of asphalt products. The late Henry Green and co-workers have likewise done extensive work to correlate and explain fundamental rheologic principles and to apply them in the printing ink and paint industries. In England, Scott-Blair has studied the rheological properties of dairy and other food products. These are in many ways comparable to rubber coating doughs. His group has put on a scientific basis the human and psychological factors involved in the empirical tests and judgments made by factory workers and "experts."

Current Experimental Work

During the past several years, the present author's laboratory has conducted many viscosity studies on rubber and aqueous dispersions of rubber. Several types of viscometers have been used. The rotating cylinder type, specifically the Brookfield, has been found to be the most versatile. It has been used for all types of flow studies, including control, analysis and formulation. The next section will illustrate a few of the typical

systems plotted and will point out their practical and theoretical importance.

Before discussing these studies, it might be well to describe the mechanics and working details of the Brookfield Viscometer, with which these studies were made. This instrument is of the Couette type. A rotating bob at one end of a shaft is immersed in a stationary beaker containing the liquid being tested. The bob or spindle rotates at a definite, variable speed, exerting a shearing stress on the liquid. The other end of the shaft is connected to a calibrated torsion spring which exerts a torque as the shaft rotates in the viscous liquid. This torque in turn is indicated by a pointer on a dial also rotating at the selected speed. The markings on this dial are so scaled that, when testing Newtonian liquids, readings can be converted directly into absolute units (centipoises). The speed of the rotating spindle may be varied in successive steps by use of a gear shift.

A tenfold increase in speeds is possible, thus giving a wide range of shearing rates. One model has speeds of six, twelve, thirty and sixty revolutions per minute. Another model has speeds of two, four, ten, and twenty revolutions per minute. There are seven spindles of varying size, shape and diameter as well as special models, giving an extremely wide range of viscosity readings. In operation, the proper spindle is selected by trial, and readings are taken at each of four speeds, beginning with the lowest and progressing to the highest. In the case of thixotropic liquids, a second set of readings is taken immediately thereafter at descending speeds. The technique with thixotropic liquids will be described more thoroughly in the paper on latex.

The readings may be plotted on graph paper to indicate the type of flow present. Rate of shear (speed setting) is plotted against shearing stress (dial reading) or viscosity. The plotting of flow curves, or rheograms, is particularly important in the study of non-Newtonian liquids. Such curves indicate the type of structure within the system, plasticity and other important properties. For most control operations, where the solution being tested is of a known type or is prepared repeatedly under the same conditions, a single reading at a definite speed is usually satisfactory.

The Brookfield Viscometer is a simple instrument in use, but certain precautions must be observed when making tests, as follows:

(1) The instrument must be clamped or held so that the spindle shaft is perpendicular to the surface of the test material.

(2) Before attaching the spindle to the upper part of the instrument, the bob should be wet with the liquid so that air pockets will not form underneath.

(3) The spindle should be allowed to run for enough revolutions so that the spring and pointer come to equilibrium and a constant reading is obtained. For comparison purposes with another test, a definite number of revolutions may be counted before reading. Readings should always be made on the same spot of the dial face. This may be marked by a hairline drawn on the glass.

(4) A standard temperature should be used. Samples (about one pint in size) may easily be brought to this temperature. Temperature-correction factors may also be used, since they can be determined readily and are reproducible (see Figure 2).

The graphs shown in Figures 3 to 10 are rheograms showing the results of viscosity measurements on a variety of rubber solutions, determined in the author's laboratory. The solutions are typical of those used in the rubber industry. These particular solutions may be classed as Newtonian and pseudoplastic liquids.

Industrially important properties of rubber solutions

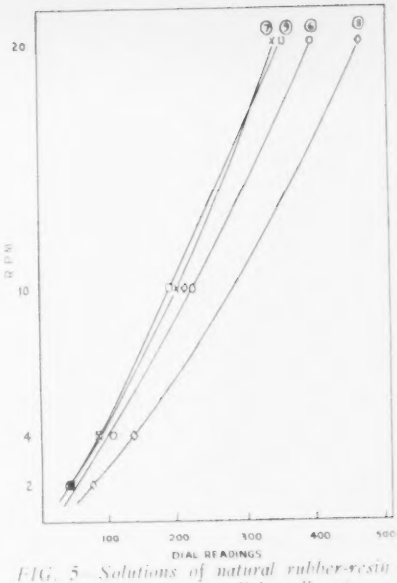

FIG. 5—Solutions of natural rubber-resin compounds (rpm vs. dial readings).

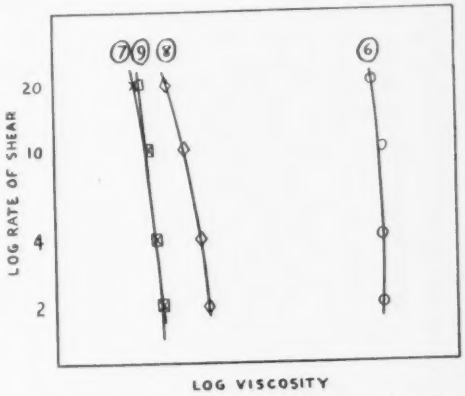

FIG. 6—Solutions of natural rubber-resin compounds in hydrocarbon solvents (log rate of shear vs. log viscosity).

may be deduced from these curves. Viscosity data are here plotted in two different systems, rectangular and logarithmic. In this laboratory such curves are used in conjunction with other data to determine the suitability of the compounds for particular applications. It is the shape of the curve rather than the absolute viscosity which is of importance. Because any given rubber solution will show a variation in flow under conditions of use, a laboratory instrument which plots such changes is valuable. Such an instrument is the rotational viscometer.

Curves 1, 2, 3, 4 and 5 (Figures 3 and 4) represent solutions of natural rubber in an appropriate solvent system. Solution 1 contains eight percent of rubber (by weight); solution 2, twelve percent; solution 3, fifteen

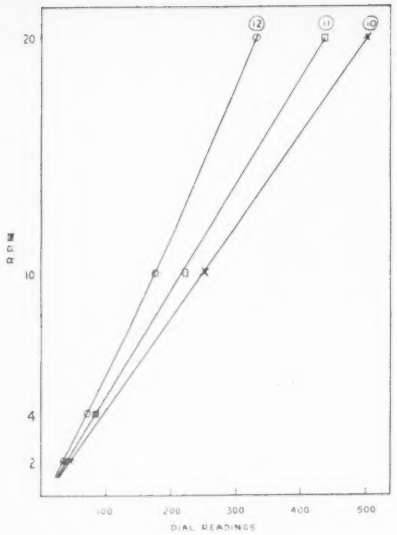

FIG. 7—Miscellaneous solutions (rpm vs. dial readings).

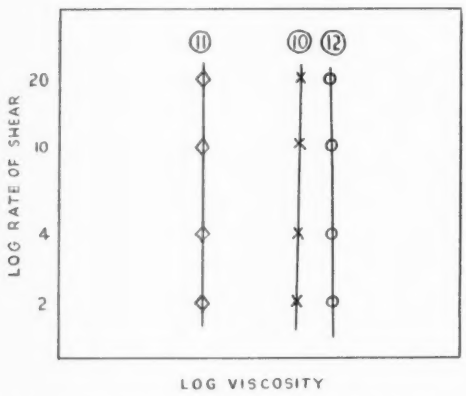

FIG. 8—Miscellaneous solutions (log rate of shear vs. log viscosity).

percent; solution 4, seventeen percent; and solution 5, eighteen percent. Solutions 4 and 5 approach dough-like consistency. These curves can be correlated with conditions of mastication, plasticity of milled rubber, other physical conditions of the solid compound and the nature of the solvent. These solutions are known as "pseudoplastic" liquids. By definition, these are liquids which require no initial force to *start* flow, but do show a drop in "apparent" viscosity as the rate of shear increases. Truly plastic materials require an initial force ("yield value") to start their flow. The term "apparent" is used because the viscosity varies continuously with rate of shear in non-linear increments. It is believed that the deviation from Newtonian-type flow is due to the internal structure of the rubber solution and to the extremely large size of the coil-like rubber molecule.

Solutions represented by curves 6, 7, 8 and 9 (Figures 5 and 6) contain natural rubber-resin compounds dissolved in suitable solvents. These liquids also are pseudoplastic and have the same general flow pattern as those in the preceding figure. It would be interesting to plot rheograms of solutions of the resins and rubber separately, to determine and predict the effect of an added resin on the flow properties of the rubber solution. Curve 10 in Figures 7 and 8 is a rheogram of a fourteen percent solution of Butyl rubber in a saturated aliphatic hydrocarbon. It shows Newtonian behavior, that is, the absolute viscosity remains constant as the rate of shear is increased. Values for this type of viscosity may be

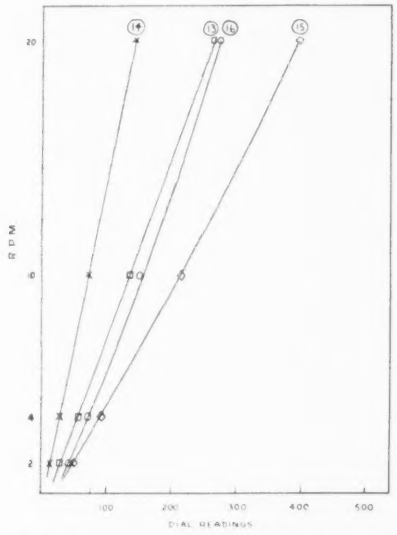

FIG. 9—Rubber derivatives (rpm vs. dial readings).

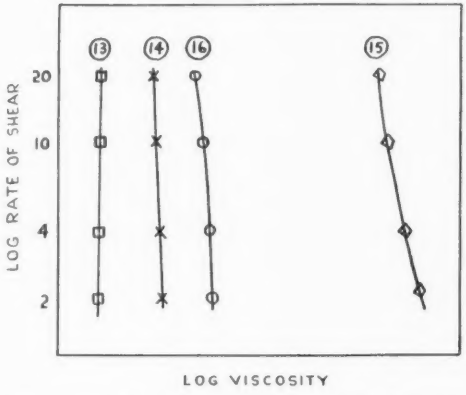

FIG. 10—Rubber derivatives (log rate of shear vs. log viscosity).

obtained in absolute units with the Brookfield viscometer. Curve 11 is also Newtonian. This is a solution of a neoprene-resin compound. The neoprene is highly plasticized. Curve 12 is that of a solution of natural rubber in a chlorinated hydrocarbon solvent. Solutions 2 and 12 contain the same weight of rubber per unit volume, the first solvent being a saturated aliphatic hydrocarbon and the second a chlorinated hydrocarbon. The shape of the curve is quite similar, indicating similar flow properties. The chlorinated hydrocarbon was used to render the solution non-inflammable.

Curves 13 to 16 (Figures 9 and 10) are those of solutions of rubber derivatives in aromatic hydrocarbons, with added pigments and inert fillers. These rubber derivatives are hard, resinous products which give a protective coating type of film. Solutions 13 and 14 are the same formulation, except that the solute compound of 14 has undergone milling. This breakdown has not only lowered the viscosity but has changed the flow characteristics from pseudoplastic to Newtonian. Solutions 15 and 16 are also the same formulation, 16 having undergone milling. In this case, there has been a loss of "pseudoplasticity," but not a complete change to Newtonian behavior. Since these solutions were designed for coating and adhesive applications, their film-forming properties and application behavior are important. These curves may be correlated with such properties as levelling, brushability and sprayability. In a commercial preparation these physical properties are fully as important as the properties of the dried film itself.

For simpler types of cements, such rheograms may be used as an analytical aid for matching a sample of unknown composition. Curves 7 and 9 are examples of this.

Newtonian liquids are defined as "simple" liquids, which show a linear proportionality between rate of shear and shearing stress over the entire range of values being used. The absolute viscosity remains the same over this range. By use of a table of factors supplied with the Brookfield Viscometer, dial readings may be converted directly into absolute units or centipoises.

Non-Newtonian liquids are those which depart from the linear functions over their range of flow. The absolute viscosity varies with the speed of rotation or the rate of shear. By using the table of factors with these solutions, an "apparent" viscosity figure is obtained. This figure is of value either in single point determinations or for a rheogram plotted for the entire rotational range. An "internal structure" is involved in this anamolous behavior. In the case of rubber solutions, the elastic properties of the rubber molecules are also an important factor.

Conclusion

Because of the wide variety of formulations used in rubber cements and doughs, over-all generalizations cannot be made. It need only be mentioned that compounds ranging from simple Newtonian to highly complex liquids have been encountered. Because of the sensitivity and reproducibility of results, the Brookfield Viscometer enables any rubber laboratory to carry through a rheology program which can give results of practical value.

A study of the existing literature as described earlier in this paper shows that several advances have been made in this field. Viscosity studies have been applied in the synthetic rubber program, in order to improve the manufactured elastomers and to learn more about their processing qualities. The effects of various additions have been studied by these means.

One of the outstanding developments has been in instrumentation. The appearance of rotational viscometers, easy to use, has given impetus to the discarding of the old rule-of-thumb judgments which prevailed since the beginning of the rubber industry. The rubber industry has been one of the foremost in adopting this type of instrumental control. Modern rheological procedures are a step in the utilization of scientific principles in rubber processing. In this way the finished product may be manufactured more easily and be of better quality.

ACKNOWLEDGMENT

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Reports of Rubber Activities in Various Foreign Countries

Finland: The rubber industry in Finland was severely handicapped by increases in world market prices in the second half of 1950, as all raw materials for this industry must be imported.

Production of automobile tires was approximately 70,000 units in 1950 compared with 42,000 units in 1949; the output of tubes in 1950 was 80,000 compared with 44,000 in the preceding year; bicycle-tire production was 600,000 and bicycle-tube production was 560,000 in 1950, compared with 370,000 tires and 480,000 tubes in 1949. The output of rubber shoes was 3,600,000 pairs last year, an increase of 300,000 over production in 1949.

Anticipated production in 1951 is equivalent to that of 1950, except for a reduction to 400,000 bicycle tires and the same number for bicycle tubes, if raw materials are available.

The factories used about 3,600 tons of natural rubber in 1949, about 4,700 tons in 1950, and anticipated requirements are for 5,000 tons in 1951. It is doubtful, however, that the 1951 requirements can be met, and it may be necessary to concentrate the production of the rubber industry on products which are essential to the national economy. It is considered possible to obtain enough raw materials for the production of these essentials.

The over-all production is not usually sufficient to meet demand. In 1950 about 45,000 automobile tires of different makes as well as other finished and semi-finished products were imported. It may not be possible to maintain imports at this level in 1951.

Italy: Italian output of rubber products in the first 11 months of 1950 reached 68,440 metric tons, an increase of 15 percent over 1949. Output in the full year 1950 probably amounted to about 75,000 tons, a record. For 1951, the industry expects an increase to about 100,000 tons. Approximately 60 percent of the 1950 production volume was in automobile tires and tubes (56 percent in 1949), 22 percent in technical articles, and the remainder in cycle tires, footwear, soles, heels and sundry items.

The industry is reported to have operated at about 90 percent of capacity during the past year, and with construction of new plants nearing completion, together with modernization of existing facilities with ERP equipment, plant capacity will be increased in 1951. Thus, the 30 percent increase in output programmed for 1951 appears to be physically possible. In fact, industrialists believe that a 40-percent increase over 1950 might be attained if the defense program required it.

Furthermore, as the 1950 output of 75,000 tons covered Italy's domestic requirements and permitted exports of approximately 15 percent of total sales, it may be assumed that a substantial part of the 1951 production increase could be dedicated to military production without seriously affecting domestic consumption, even after allowing for an increased demand from the domestic civilian market.

Japan: Production of rubber goods in Japan increased notably in the first 9 months of 1950 over the output for the entire year 1949. Production of tires rose to 13,171,500 units in the first 9 months of 1950 from 6,366,000 units in 1949, and tube production was up to 13,549,700 units in the 1950 period from 6,524,400 units in 1949. (Figures for 1950 are preliminary, for 1949 revised.) Although the output of truck tires decreased to 319,400 units in the first 3 quarters of 1950 from 482,000 units in 1949, and truck tubes dropped to 319,700 units from 468,900 units in the respective periods, the output of all other tires increased. The greatest increases were in bicycle tires, 12,330,000 units, and motorcycle tires, 251,500 units, against 5,528,700 bicycle tires and 197,700 motorcycle tires produced in 1949. The output of bicycle and motorcycle tubes increased correspondingly. Production of balloon tires was 216,100 in the 1950 period, compared with 122,000 in 1949.

Production of rubber footwear rose to 60,575,600 pairs in the first 9 months of 1950, compared with 41,484,500 pairs in 1949. Production of rubber-soled canvas shoes, 26,881,700 pairs, and of rubber boots and shoes, 11,268,100 pairs, in the 1950 period was nearly double the output of each class in the previous year, while the output of rubber-soled socks rose to 22,425,800 pairs from 22,255,000 pairs.

Imports of crude rubber amounted to 36,170 metric tons and latex to 1,204 tons in the first 9 months of 1950, compared with 40,946 tons of crude and 1,111 tons of latex imported in the full year 1949. Consumption was 41,836 tons of crude and 451 tons of latex in the 1950 period, compared with 34,226 tons of crude and 567 tons of latex in 1949.

All Welded Support for Multiple Platen Press

By OTTO E. HERMANNS

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The following data and illustrations were submitted by the author in the 1947 Design-for-Progress Program conducted by the James F. Lincoln Arc Welding Foundation of Cleveland, Ohio. The program covered advances and improvements made in design, fabrication, construction and maintenance by means of arc welding. The report published herewith was awarded 4th prize in the Industry Machine Division—Editor.

IN the designing and planning of automatic machinery and heavy presses in the rubber industry, one is not usually confronted with the problem of floor space but with the location of the equipment concentrated around a machine. A condition where such equipment is restricted in size necessitates a design of maximum strength and minimum dimensions. The purpose of this paper is not only to illustrate and explain the advantages of a welded support compared to a similar one that is riveted but also to show that the comparative

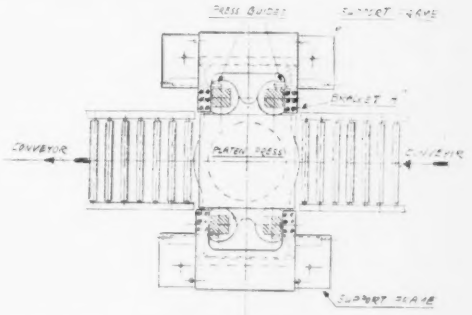


FIG. 1—Plan view showing arrangement of multiple platen press with support frames and conveyors.

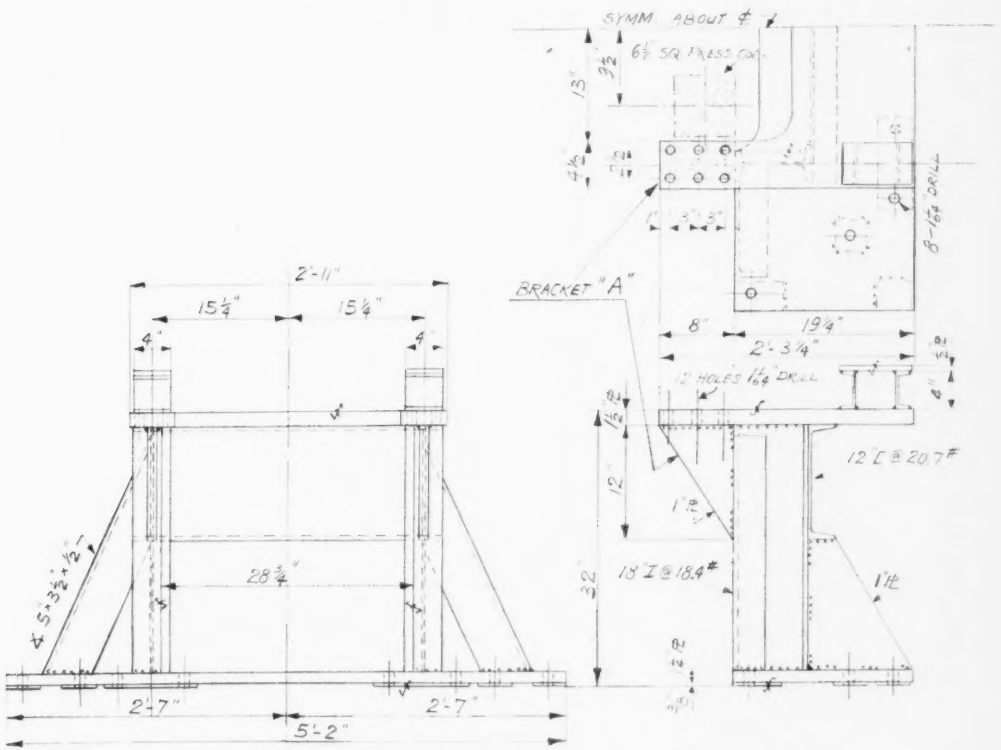


FIG. 2—Support frame for multiple platen press—all welded design. All welds are 7/16-inch fillet except as noted.

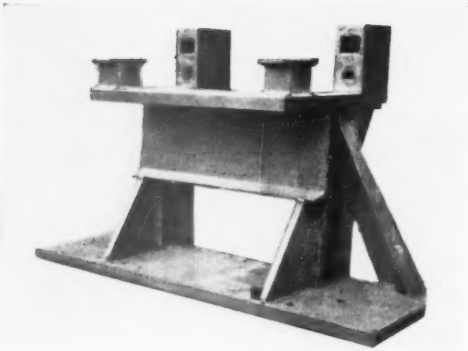


FIG. 3—Front view of unit showing blocks and wedge holes.

simple welded construction incorporates these features of high strength and minimum size.

Many vulcanizing presses of the stationary, upright standard type are in use by the rubber companies in the molding of rubber goods and are easily accessible for the operator. There is ample room for tables, hydraulic cylinders, steam piping and electrical equipment. However, a multiple platen press which is fully automatic with feeding and take-off conveyors on opposite sides of the press cannot be supported in the conventional manner.

Since the press itself moves up and down it must be guided and supported on the two remaining sides (see Figure 1). The total weight of the press including the molds is approximately 36,000 lbs. and when the platens are correctly positioned with the top of the conveyor rolls, the movement of the press is stopped and the entire load of 36,000 lbs. is carried by these supports. Needless to say the operation of this press requires several special hydraulic cylinders, electrical equipment, solenoid valves, control mechanism, steam, air and hydraulic piping, together with the feed and take-off conveyors. The full explanation of the mechanism and operation of the press is secondary as this discussion deals primarily with the description of the supports. Obviously, there is little space left for the supporting frames around the press.

One of the two identical supports is shown in Figure 2. These supports have extended brackets, "A," that carry the total weight of the press on four corners; this load is transmitted through movable wedges sliding in solid steel blocks, which are bolted to the frame. The blocks with the wedge holes are shown in Figures 3 and 4 but only the supporting frame will be described in this article.

In operation, a quarter of the total weight of the press of 36,000 lbs. will come to a stop on each bracket, "A." This may take place every 6 minutes while the press is in use. The subsequent stress calculations for the supports were kept to approximately 7,000 p.s.i. which is within the limit of safe fatigue stresses. Shock loads never occur since a shock absorbing medium is provided.

Explanation of Stresses Involved

Diagrammatic data on the stresses involved are shown in Figures 5 (bracket) and 6 (reinforced beam). Explanatory data on these sketches are as follows:

Stress in Bracket "A" (Figure 5)

Center of gravity about X-X:

$$C = \frac{Aa+Bb}{A+B} = \frac{(1.5\times2.47)(.75)+(10\times1)(6.5)}{(2.47\times1.5)+(10\times1)} = \frac{2.78+65}{3.71+10}$$

$$C = 4.93$$

Moment of Inertia through center of gravity:

$$I_{x\text{-}x} = \frac{bh^3}{12} + bhx_1^2 + \frac{cd^3}{12} + cdx_2^2$$

$$= \frac{(2.47)(1.5)^3}{12} + (2.47)(1.5)(4.18)^2 + \frac{(1)(10)^3}{12} + (1)(10)(1.57)^2$$

$$= .696+64.6+83.33+24.6$$

$$I_{x\text{-}x} = 173.23 \text{ in.}^4$$

$$S = \frac{Mc}{I} = \frac{(9000)(9)(6.57)}{173.23} = 3070 \text{ P.S.I.}$$

This stress is kept low to allow for small holes in the 1-inch gusset plate (B) which will be drilled at assembly for mounting control levers.

Stress in 8-inch Reinforced Beam (Figure 6)

Area of 8" Beam @ 18.4#	5.34	Sq. in.
Area removed	.34	
	5.00	
Area of 7 x 1 reinforcing bar	+7.00	
Total area	12.00	Sq. in.

$$I_a = \frac{bh^3}{12} + ax^2 = \frac{(1)(.34)^3}{12} + (.34)(3.812)^2$$

$I_a = 4.95$ in.^{4} (to be taken out of beam)

I_1	for 8" Beam @ 18.4#	56.9	in.^{4}
I_2	for 7 x 1 reinforcing bar	28.6	
	Total	85.5	in.^{4}
I_a	removed part	−4.95	
		I = 80.55	in.^{4}

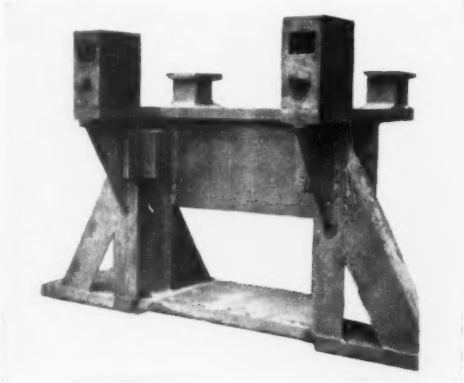


FIG. 4—Rear view of unit showing blocks and wedge holes.

Stress for eccentric loading:

$$S = \frac{P}{A} + \frac{Mc}{I} = \frac{9000}{12} + \frac{(9000)(14)(4)}{80.55}$$

$$S = 750 + 6250 = 7000 \text{ P.S.I.}$$

Adjustable Metaline wearing plates are provided and mounted to the supports to compensate for any misalignment during the travel of the press up and down. During this motion a considerable side thrust is absorbed by the 8-inch reinforced beam which then carries no other load. The beam is also braced to the support frame proper.

The four guide brackets which carry the bearing plates are made from built-up angle sections and welded as shown in Figure 7.

The main stresses of the support have been mentioned and occur near the bracket, "A." Any other strains that might result from extra weight and moving machine parts on the top platen are of a minor nature. The top plate is made heavy to provide a convenient place for the accommodation of all necessary equipment for the operation of the press.

Comparison with Riveted Design

Knowing the function of the supporting frames and the limited space in which they had to be installed the welded design was the answer to this new product. However, a riveted design was laid out to consider all phases for comparison. It is a typical ordinary construction layout of no special publication value, although in appearance it looked slightly like the all welded design.

Many features of this riveted type of construction proved to be unfavorable. For example:

1. In order to hold the low stresses calculated in the all welded design, heavier sections were required. How-

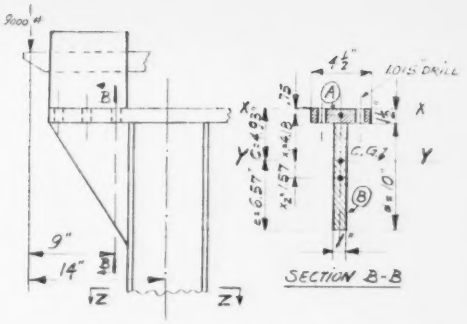


FIG. 5—Stress in bracket "A".

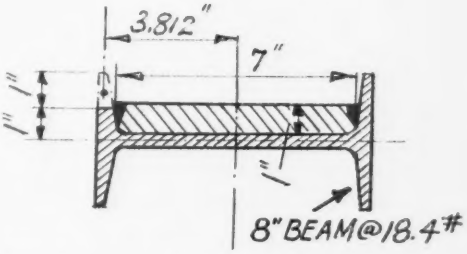


FIG. 6—Stress in 8-inch reinforced beam (section Z-Z from Figure 5).

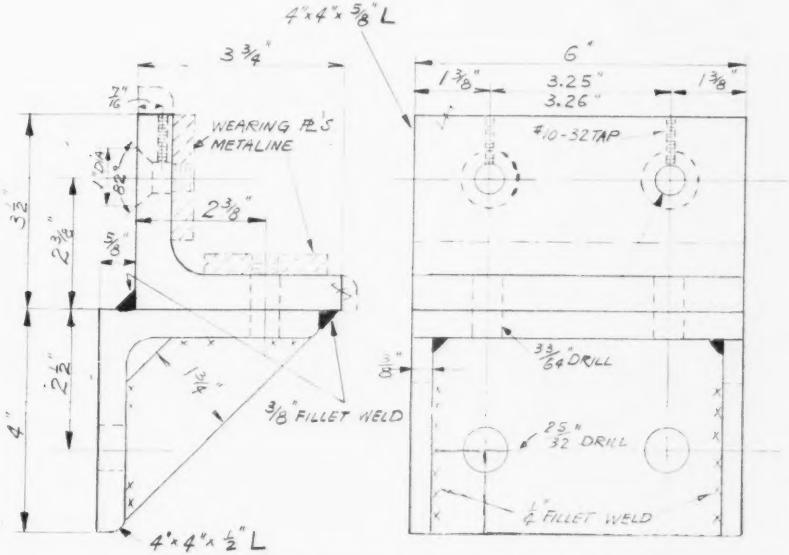


Fig. 7—Guide bracket of steel welded construction (four required).

ever, these sections could not be maintained due to the limited space and the nature of the design.

2. Two special bent plates mounted back to back were necessary to substitute for the gusset plate supporting bracket, "A". Mounting of these plates was difficult for interference occurred where the press guides were fastened. Rivets were omitted on one flange which unbalanced the fastening of the plates.

3. The top plate of the supporting frame is machined which requires drilling and countersinking for rivets. These points and the fact that the riveted design is more complicated show the superiority of the all welded type.

Originally it was intended to compare the welded design with a steel casting. However, to have the frame cast would have required several patterns and the cost would have been prohibitive compared with the all welded construction.

Cost Analysis

Comparison of the relative cost of the all welded support with the all riveted type is outlined below. The basis to determine the cost of both constructions is made under the assumption that the work is to be done in the conventional machine shop which is not set up for mass production.

Over-All Cost of All Welded Support

Cost of Flame Cutting

The following data on flame cutting costs is based on the "Procedure Handbook of Arc Welding Design and Practice" issued by the Lincoln Electric Co. The operating factor is that determined in our own shop.

1⅝ and 1⅜-Inch Plates

Speed ..... 50 ft./hr.
Operating factor 30%
Gas ..... $0.04/ft.
Labor ..... $1.50/hr. /
Overhead 100% ..... $1.50/hr. \ $3.00/hr.

$$\text{Labor cost} \quad \frac{3.00}{50 \times .30} \quad \ldots\ldots \$0.20/\text{ft.}$$

$0.24 /ft.

1-Inch Plate

Speed ..... 70 ft./hr.
Operating factor 30%
Gas ..... $0.03/ft.
Labor ..... $1.50/hr. /
Overhead 100% ..... $1.50/hr. \ $3.00/hr.

$$\text{Labor cost} \quad \frac{3.00}{70 \times .30} \quad \ldots\ldots \$0.15/\text{ft.}$$

$0.18/ft.

Cost of Welding

The following data on cost and speed of welding is based on "Fleet Welding," Bulletin No. 440, issued by the Lincoln Electric Co.

Cost of 7/16-inch Continuous Fillet Weld (Horizontal Position)

Speed (2 passes) 27.5 ft./hr. ..... 20% Operating factor
Labor ..... $1.50/hr. /
Overhead 100% ..... $1.50/hr. \ $3.00/hr.

$$\text{Labor cost} \quad \frac{3.00}{27.5 \times .20} \quad \ldots\ldots \$0.545/\text{ft.}$$

Electrode ..... $0.08/lb.
Lbs. of Elect./ft. of weld (.54) .08 × .54 ..... $0.043/ft.
Power 425 Amp. × 30 V. = 12.75 KWH using 50% efficiency
1 KWH $0.02

$$\text{Power cost} \quad \frac{12.75 \times .02}{27.5 \times .50} \quad \ldots\ldots \$0.019/\text{ft.}$$

Total cost of 7/16" Welding ..... $0.607/ft.

Cost of 7/16-inch Continuous Fillet Weld (Vertical and Overhead Position)

Speed (2 passes) 9 ft./hr. ..... 20% Operating factor
Labor ..... $1.50/hr. /
Overhead 100% ..... $1.50/hr. \ $3.00/hr.

$$\text{Labor cost} \quad \frac{3.00}{9 \times .20} \quad \ldots\ldots \$1.667/\text{ft.}$$

Lbs. of Elect./ft. of weld .54 × .08 ..... $0.043/ft.
Power 170 Amp. × 30 V. = 5.1 KWH

$$\text{Power cost} \quad \frac{5.1 \times .02}{9 \times .50} \quad \ldots\ldots \$0.023/\text{ft.}$$

Total cost of 7/16" Welding ..... $1.733/ft.

Cost of ¼-inch Continuous Fillet Weld (Horizontal Position)

Speed (1 pass) 50 ft./hr. ..... 20% Operating factor
Labor ..... $1.50/hr. /
Overhead 100% ..... $1.50/hr. \ $3.00/hr.

$$\text{Labor cost} \quad \frac{3.00}{50 \times .20} \quad \ldots\ldots \$0.300/\text{ft.}$$

Power 300 Amp. × 30 V. = 9 KWH

$$\text{Power cost} \quad \frac{9 \times .02}{50 \times .50} \quad \ldots\ldots \$0.007/\text{ft.}$$

Total cost of 1/4" Welding ..... $0.307/ft.

Since the cost of cutting and welding per foot has been determined, the total costs for these operations are summarized as follows:

Total Cost for Flame Cutting

1⅝" and 1⅜" plates ..... 27 ft. @ $ .24	$ 6.48
1" plates ..... 12 ft. @ $ .18	$ 2.16
Total	$ 8.64

Total Cost of Welding (One Support Frame)

⅞" fillet weld, horizontal position 9 ft. @ $ .607	$ 5.47
⅞" fillet weld, vertical and overhead positions 25 ft @ $1.733	$43.33
¼" fillet weld, horizontal position 18 ft. @ $ .307	$ 5.53
Total	$54.33

Bill of Material for One Complete Support (Structural and Mild Steel)

		lbs.
1 plate	— 27½" x 35" x 1⅝"	488.0
1 plate	— 19" x 62" x 1¾"	412.0
1 plate	— 12" x 8" x 1"	27.0
1 plate	— 12" x 14" x 1"	47.0
2 plates	— 7" x 24" x ⅞"	82.0
2 plates	— 4" x 4" x ½"	4.5
2 plates	— 4" x 3" x ½"	3.4
2 plates	— 5" x 3" x ½"	4.2
2 plates	— 4" x 8½" x ½"	6.5
2 plates	— 4" x 6½" x ½"	7.3
2 plates	— 4" x 7¾" x ⅝"	11.0
4 bars	— 1¾" x 4½" x ⅜"	3.3
1 channel	— 12" @ 20.7 lbs. x 34½"	59.5
2 beams	— 8" @ 18.4 lbs. x 24"	73.6
2 angles	— 5" x 3½" x ½" x 26¾"	59.5
2 angles	— 4" x 4" x ½" x 6"	12.8
2 angles	— 4" x 4" x ½" x 6"	15.7
		1270.5
	Plus 3% waste	38.1
	Total weight	1308.2

Material cost: 1308 lbs. @ $.07/lb. $91.50

Fabrication Cost of One Support Before Welding

Marking-off plates, etc.	4 hrs.
Saw cutting	4 hrs.
Rough planing	8 hrs.
Line-up	3 hrs.
Total	19 hrs.
Labor ..... $1.60/hr. }	
Overhead 100% ..... $1.60/hr. } $3.20/hr.	
Total labor cost 19 × $3.20	$60.80

Fabrication Cost for One Support After Welding

Marking-off for final machining and marking-off holes	8 hrs.
Machining and drilling (also spot facing)	52 hrs.
Painting 2 coats lead and oil	5 hrs.
Total	65 hrs.
Labor ..... $1.60/hr. }	
Overhead 100% ..... $1.60/hr. } $3.20/hr.	
Total labor cost 65 × $3.20	$208.00

Complete Cost of One All Welded Support

Material	$ 91.59
Pre-machining before welding	$ 60.80
Flame cutting	$ 8.64
Welding	$ 54.33
Final machining and painting	$208.00
Total	$423.36
For two complete supports	$846.72

Since these supporting frames were welded in the conventional manner at room temperature they were not stress relieved. We have found that similar welded fabricated applications, which are now in use, proved satisfactory without stress relieving.

Cost data on the all riveted support follows. At this point it should be mentioned that the Metaline wearing plates and bolts for both types of construction, i.e., all welded and all riveted, are not included in any of the estimates shown.

Over-All Cost of All Riveted Support

On inquiry it was found that for this type of frame the cost per rivet for driving is as follows:

30 ¾-inch Rivets per Hour

2 men—1 riveting—1 bucking @ $1.50/hr.	$ 3.00
1 heater @ $1.50/hr.	$ 1.50
Total	$ 4.50
Overhead 100%	$ 4.50
Cost per hr.	$ 9.00

$$\text{Cost per } \tfrac{3}{4}\text{" rivet} = \frac{9}{30} = \$\ .30$$

42 ½-inch Rivets per Hour

$$\text{Cost per } \tfrac{1}{2}\text{" rivet} = \frac{9}{42} = \$\ .22$$

Total Cost of Riveting (One Support Frame)

157 ¾" rivets @ $.30	$47.10
56 ½" rivets @ $.22	$12.32
Total	$59.42

Cost of Rivets

98 B.H. rivets ¾"—2⅝" lg. 49 lbs./100	48.0 lbs.
59 CTSK. rivets ¾"—2¼" lg. 33 lbs./100	19.5 lbs.
56 CTSK. rivets ½"—3⅛" lg. 22 lbs./100	13.0 lbs.
Total weight	80.5 lbs.
Total cost of rivets 80.5 lbs. × $.09/lb.	$7.25

Total Cost of Flame Cutting

The cost for cutting the top and bottom plate and the gusset plates is approximately the same as for the all welded design, viz	$8.64

Total Cost of Material for One Complete Support (Structural and Mild Steel)

The total weight of the all welded frame is	1308.0 lbs.
The extra material for the riveted frame is as follows:	
Angles—3" x 3" x ½" (9.4 lbs./ft.) x 11 ft.	104.0 lbs.
Wider top plate—27½" x 2" x 1⅝"	25.0 lbs.
8" CB @ 27.0 lbs. (riveted frame)	
8" @ 18.4 lbs. (all welded frame)	
Diff. 8.6 lbs. x 4 ft.	34.4 lbs.
Diff. of 6 lbs. for heavier guide brackets	6.0 lbs.
Total weight	1477.4 lbs.
Material cost ..... 1477 lbs. @ $.07/lb.	$103.39

Fabrication Cost of One Support Before Riveting

Marking-off plates, etc.	6 hrs.
Saw cutting	5 hrs.
Marking 214 rivet holes	8 hrs.
Drill all ¾" and ⅞" holes (also countersink some holes)	24 hrs.
Bent 4 spec. plates for bracket "A"	4 hrs.
Line-up and put bolts into holes	4 hrs.
Rough planing before riveting	8 hrs.
Total	59 hrs.
Labor ..... $1.60/hr. }	
Overhead 100% ..... $1.60/hr. } $3.20/hr.	
Total labor cost 59 × $3.20	$188.80

Fabrication Cost of One Support After Riveting

Marking-off for final machining and marking-off remaining holes	8 hrs.
Machining and drilling	52 hrs.
Painting 2 coats lead and oil	5 hrs.
Total	65 hrs.
Labor ..... $1.60/hr. }	
Overhead 100% ..... $1.60/hr. } $3.20/hr.	
Total labor cost 65 × $3.20	$208.00

Complete Cost of One All Riveted Support

Material	$ 103.39
Flame cutting	$ 8.64
Pre-machining before riveting	$ 188.80
Cost of rivets	$ 7.25
Riveting	$ 59.42
Final machining and painting	$ 208.00
Total	$ 575.50
For two complete supports	$1151.00

Comparison for Supports (2 Required per Press)

	Weight of supports	Cost of supports
Riveted design	1477 lbs.	$1151.00
Welded design	1308 lbs.	$ 846.72
Savings by Arc Welding	169 lbs.	$ 304.28
Proportionate Cost Saving		73.6%

$$\frac{846.72 \times 100}{1151.00}$$

Summary

The analysis shows an actual saving of $304.28 or 26.4% in cost and a saving in weight of 169 lbs. or 11.5% by arc welding type over the riveted type of construction. The gross saving to the rubber and plastic industries would be difficult to determine; however, these are large concerns and ever increasing in size and considerable saving should be made.

The all welded design requires less space and has the strength where it is needed. The simple plate sections are easily welded to structural members without weakening them and give a good and strong appearance.

Rivets even when countersunk are not desirable in plates if machine parts are mounted to them. A welded

plate allows variable mounting locations since there is no interference with rivet holes.

The adoption of welding for fabrication of machine parts eliminates pattern and foundry work. Steel plate is easily carried in stock at a minimum expense and can be conveniently handled.

Using welded frames instead of castings for machinery is desirable for there is complete freedom from sudden fracture. A structural welded design that is overloaded tends to bend before failure, and this can be readily seen.

The supporting frame described was laid out as the last item. It was designed, fabricated, welded and installed in less than two months. This important time factor should not be overlooked, especially since the rest of the equipment was in readiness for operation.

As an over-all picture of this welded construction it has been shown that considerable time, money and weight has been saved without sacrificing strength of the finished product confined within a limited space.

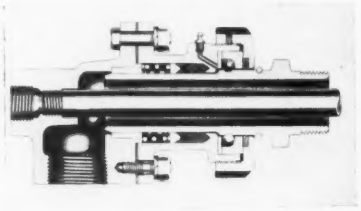
Westinghouse Electric Heater

Readily adaptable to batch or continuous production methods, a new 20-kw radio-frequency generator for dielectrically heating a wide range of metallic materials in the rubber, textile, wood, and other industries, has been made available by the Westinghouse Electric Corp., Pittsburgh 30, Penna. The generator delivers rated power at a 100% duty cycle in accordance with NEMA

standards. Equipment operating controls are held to a minimum. All adjustments necessary for operation of the equipment are made from the front panel. Built-in load coupling and tuning elements permit transfer of power into a wide range of loads by front panel control. Push-button control, stepless adjustment of output power, and a complete complement of protective devices put operation of this equipment on a semi-skilled basis. The enclosure is designed to minimize radio-frequency radiation, and the complete generator is certified to comply with F.C.C. regulations. A 5-kw model is also available in two styles. One is equipped with a 6.8/13.6-megacycle dual-frequency oscillator for low and medium power density requirements such as large area panels to be heated for gluing. The other is equipped with a 27.1-megacycle oscillator for high power frequency loads such as plastic preforms.

Barco Revolving Joint

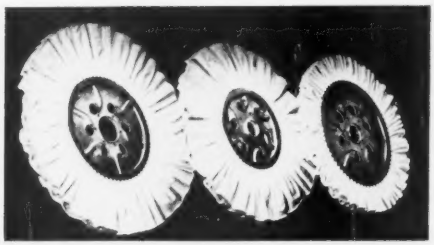
Introduction of a new, compact, improved type of revolving joint for use in making piping connections to drum type dryers, rolls, calenders, and other rotating equipment has been announced by the Barco Mfg. Co., 1801 Winnemac Ave., Chicago 40, Ill. Designated as type IBR, the new joint, as illustrated, is characterized



by extremely low torque, thus offering substantial power savings. Models are available for handling steam, oil, air, water, gas, and chemicals. The new type IBR joints are built for 150 psi, steam, or 200 psi, hydraulic, and also for vacuum service. They are recommended for speeds up to 500 rpm, steam, or 750 rpm, hydraulic, and for temperatures up to 450° F., depending on packing specified. Body types include both single and syphon or two-way flow models with straight and angle connections. In the two-way flow models, a syphon pipe is extended through the inlet tube for removal of condensate or discharge of gases or liquids.

Airflow Buffing Wheel

Recommended for finishing operations on many hard rubber items, the Airflow "Pressure-Cooled" buffing wheel manufactured by United Buff Products Corp., 255 Oak St., Passaic, N. J., requires no breaking-in, no in-



serts, spacers, dividers, etc. It is said to permit faster finishing with no risk of rejections due to burning, warpage, distortion or flow. The buff is available in various constructions and densities for specific applications and will polish any contour without difficulty. One buff rough-polishes, fine-polishes and finishes perfectly.

Designed for thinning-down, shading and tinting various size batches of material from 80 to 250 gallons, **the Change Tank Mixer #131-AB,** as produced by Charles Ross & Son Co., Brooklyn, N. Y., features simple, sturdy construction. The mixer has an explosion-proof motor in either 3 or 5 hp sizes and is directly connected to the stirrer shaft making a compact unit.

A Low Temperature Flexibility Tester

By M. A. POLLACK
Hardesty Chemical Co., Inc., New York, N. Y.

and R. A. EMMETT and A. G. COBBE
Binney & Smith Co., New York, N. Y.

THE many desirable properties of commercial plastics and elastomers have led to their widespread acceptance and use by the consuming public. With experience in the use of many of these plastics, knowledge of some of their limitations is also becoming more widespread.

One of the best known and most readily detected shortcomings is the change in physical properties that occurs when the products are exposed to widely different temperatures. For example, vinyl chloride type plastics are commonly sold in the form of handbags, aprons, upholstery materials, shower curtains, and numerous similar applications in which the "hand" and feel of the goods is a determining factor in sales. Yet it is true that the "hand," which is a composite effect of softness, flexibility, resilience, etc., depends strikingly upon the temperature at which the products are handled. In cold weather the products may become quite stiff and boardy, and numerous instances of vinyl products becoming so rigid as to crack upon slight shock are well known in the industry. It is obviously of great value to both manufacturer and consumer to eliminate or at least minimize such effects wherever possible.

With non-rigid plastics and elastomers which depend upon plasticizers for their softness, "hand," etc., it is fortunately possible to do this to a very great extent by proper selection of plasticizers. Most manufacturers are, in fact, willing to pay higher prices for plasticizers which improve low temperature flexibility, for they have found that the public in general is willing to pay the difference for the added quality.

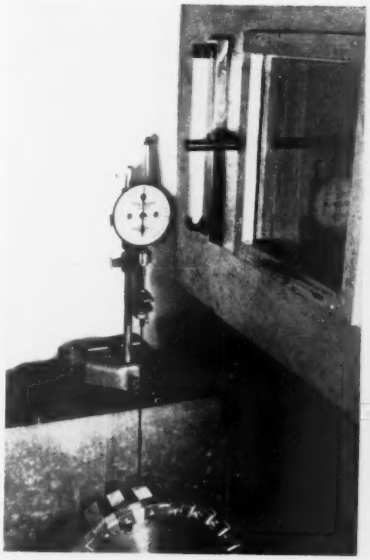


FIG. 2—Assembly with lid up, indicating exact method of contacting the sample.

FIG. 1—Cold chamber assembly set up for operation.

In our studies of the low temperature properties of elastomers, we felt the desirability of having a test method which would embody the following features:

1. It should do more than show one temperature at which products could be held to fail; in fact, it should show the changes in flexibility which occur over a range of temperatures.

2. It should accommodate large numbers of samples at one time, so that extensive studies could be made without dragging out over long periods of time, or involving too much manpower.

3. It should avoid contact between samples and liquids which could either extract plasticizers or be absorbed, and hence give erroneous results. Moreover, it is felt that liquid cold baths represent a condition far different from actual service, and might give misleading results.

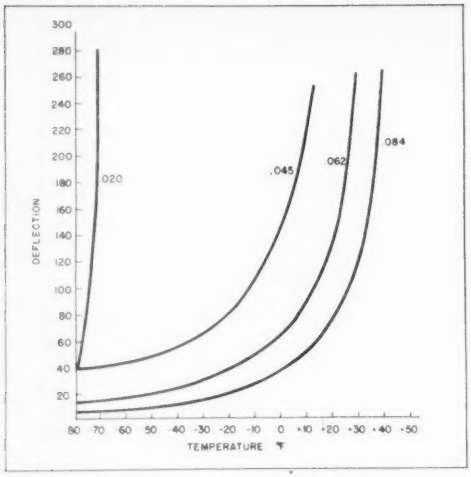


FIG. 3—Effect of thickness on low temperature flexibility measurements.

4. It should avoid any handling of samples or other exposure of samples to temperature fluctuations during test.

Equipment

The apparatus constructed to meet these conditions is as follows:

The cold chamber used is the American Instrument Co. Sub-Zero Test Cabinet, which is an insulated box with a separate compartment for the coolant (solid carbon dioxide). The temperature can be held steadily at any selected temperature down to —80°F.

The test chamber is fitted with an aluminum wheel, 14 inches in diameter, mounted on a horizontal shaft. The wheel is equipped with "L"-shaped brackets around the circumference by means of which 24 different plastic samples can be held in place. A hand wheel outside the box makes it possible to rotate the wheel and bring any desired sample to the uppermost position where its flexibility can be tested.

To test flexibility, a "Precision" Junior Penetrometer (Precision Scientific Co.) is modified as follows: Instead of a penetrometer needle, a special foot is constructed from welding rod 0.126-inch in diameter, 1.3 inches long, to the end of which is welded another piece of rod 1.25-inch long to form a "T." The top of this "T" is ground flat to provide better contact with the sample. When assembled, the "T", which weighs 23.1 grams, is inverted, passed through a fitting in the top of the box, and inserted into the chuck in the penetrometer. The penetrometer is fitted with a bolted base plate which has three levelling screws with lock nuts. These screws are ground to dull points and fitted into holes in a matching plate which rests on the top of the cabinet. Figure 1 shows the entire assembly as set up for operation. Figure 2 shows the assembly with the lid up, so that the exact method of contacting the sample can be demonstrated.

Operation

Samples 1x3-inch are cut from press-polished sheets approximately 60 mils thick and the thickness measured with a dial micrometer. The specimens are then clamped firmly against the rim of the wheel by means of the brackets so that a 2-inch portion of the sample extends at right angles to the flat of the wheel. The "T" rod is inverted and passed through the guide in the lid of the box, the lid is closed, and the rod fastened in the chuck in the test rod of the penetrometer. The penetrometer is then levelled and positioned so that the rod passes through the guides without binding. The rod is sparingly lubricated with a drop or two of dioctyl sebacate.

The temperature of the box is then lowered to —80°F. and held there for at least 20 minutes after the temperature is attained before carrying out any tests. The first sample to be tested is then moved to the highest point on the wheel. The penetrometer dial is set to zero by pulling upward on the depth gauge and the test rod brought into firm contact with the depth gauge. The penetrometer is adjusted so that the foot just makes contact with the sample, rotating the foot if necessary so that its 1.25-inch dimension is perpendicular to the long dimension of the sample. At this point the edge of the foot nearer the wheel is exactly 1 and 23/32 inches from the rim of the wheel.

The 50 gram weight provided with the penetrometer for the top of the test rod is replaced with a 74.3 gram weight which helps to give better readings.

The test rod is released for one second, and then locked by releasing the clutch spring. The depth gauge is then pushed down gently until it touches the test rod, and the dial reading in tenths of millimeters is then recorded as the measure of deflection of the sample. The foot is then raised out of the way, the next sample moved into position, and another test is run in the same fashion. After all of the samples have been tested, the temperature is raised 10°F., and a 20-minute period is allowed for the samples to reach equilibrium after the temperature has been reached. This procedure is repeated until all the samples are so limber that they do not stop the foot in a free fall after release.

To avoid frosting of the window when the cabinet lid is opened, a bag of silica gel drier is placed in the test cabinet during operation. Also, it is noted that rusting

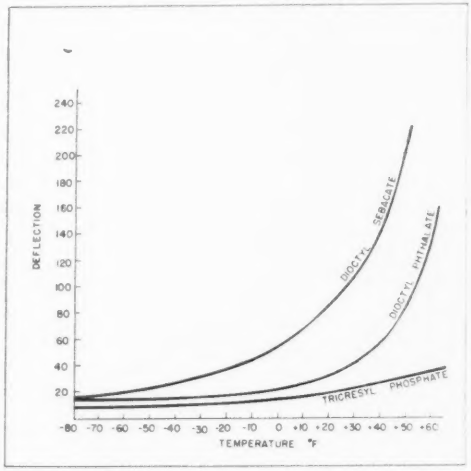


FIG. 4—Low temperature flexibility of vinyl stocks with 35 parts of plasticizer.

of the cabinet occurs if left closed when not operating, apparently due to moisture in the dry ice. This effect is eliminated by removing the dry ice basket after each run, drying it thoroughly, and then replacing it along with another bag of silica gel in the dry ice compartment.

The cabinet is supplied with a set of heating coils which at first thought appeared to be useful in raising the temperature between test readings. However, it was found that more reproducible results could be obtained if the box was allowed to warm up only by heat transfer through the walls. This is slower but it makes the job of achieving equilibrium much easier.

Results

Effect of Sample Thickness: The thickness of the sample has a very great effect on the flexibility at low temperatures, as is to be expected. This is shown clearly in Figure 3, in which tests were run on a simple vinyl chloride resin composition containing 50 parts of dioctyl phthalate plasticizer, from which samples were made up of different thicknesses. It can be seen that the flexibility increases greatly below 45 mils thickness. For the purpose of standardizing on a test method, it was decided to use 60 mils as an easily obtainable thickness in a not-too-critical range of thicknesses as the standard for this test method.

General Behavior: The characteristics of the curves furnish information as to what happens when vinyl resin stocks of this general type are brought to lower and lower temperatures. For example, considering the 62 mil stock in Figure 3, flexibility remains quite good until about 20°F. is reached. Further cooling produces a sharp increase in stiffness, and at about 0°F. the plastic is fairly rigid. On further cooling, this rigidity increases until a point is reached at which the sample will crack if bent rapidly over a sharp angle.

Effects of Different Plasticizers: Figures 4, 5, and 6 show the results obtained with similarly made stocks employing three different plasticizers, namely, tricresyl phosphate, dioctyl phthalate, and dioctyl sebacate, at concentrations of 35, 50, and 65 parts per 100 parts of Geon 101 resin. The only other ingredient in these compounds was dibutyl tin dilaurate as stabilizer, in a concentration of 1 part per 100 of resin.

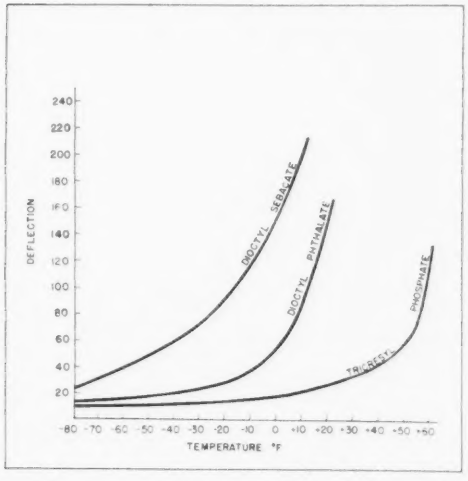


FIG. 5—Low temperature flexibility of vinyl stocks with 50 parts of plasticizer.

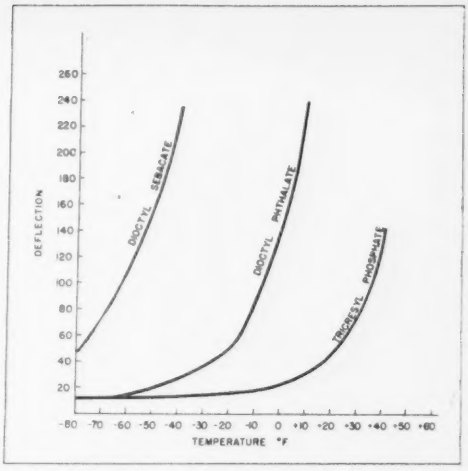


FIG. 6—Low temperature flexibility of vinyl stocks with 65 parts of plasticizer.

The striking differences in effectiveness between these three plasticizers in regard to providing low temperature flexibility are at once apparent. Dioctyl sebacate is clearly outstanding in maintaining flexibility to the lowest temperatures, tricresyl phosphate is quite poor in this respect, while dioctyl phthalate lies roughly midway between.

Interpretation of Results

To determine the effects of different plasticizing systems on flexibility changes down to low temperatures, it is very instructive to compare entire curves with one another. In doing this in the current study and also in other studies employing a wide variety of plasticizers, it was apparent that at least three significant features were present, namely, stiffening temperature, rigid temperature, and stiffening rate. These are discussed below.

Stiffening Temperature: For most practical applications of this class of products, it is probably true that the temperature at which a marked degree of stiffening occurs is of greater importance than the temperature at which the product will crack on bending. The curves demonstrate that this marked change in stiffness occurs over a comparatively narrow range of temperatures, and by taking the approximate midpoint of this range we can assign "Stiffening Temperature" values which should be quite significant and representative of the plasticizer system used. We have done this by noting the temperatures corresponding to deflections of 180 units or 18 millimeters, taken from the curves.

Rigid Temperature: The temperature at which the samples become so stiff as to crack on sharp bending is also an important characteristic of any stock. The regions of rigidity are shown on the curves by the horizontal portions, and the portions of the curves just rising from the horizontal regions were taken to give representative figures characteristic of the rigid temperatures for any stock. As a practical method of measurement, the intercept on the vertical axis is noted

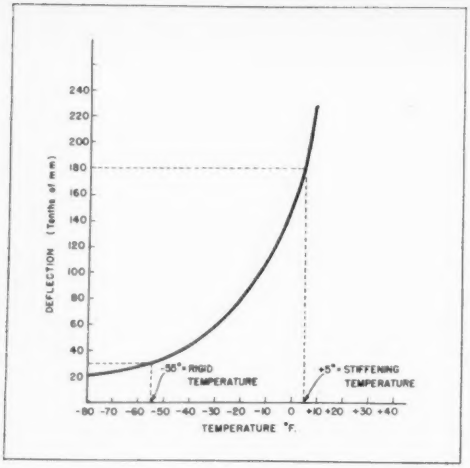


FIG. 7—Procedure for determining "Rigid Temperature."

for any curve which becomes horizontal or practically so, a figure of 10 is added to this intercept value, and from this new (intercept plus 10) value, a horizontal line is drawn across the graph until it intersects the flexibility curve. The temperature corresponding to this point on the curve is called the "Rigid Temperature." Figure 7 demonstrates this procedure.

It is worthy of note that Rigid Temperature values derived in this way have been found to correlate fairly well with actual cold crack test values obtained in other ways.

Stiffening Rate: This work has demonstrated further that plastic compounds vary considerably in the rates at which changes in temperature will produce changes in softness or stiffness.

We have been able to derive Stiffening Rates from the curves in terms of the change in deflection per degree change in temperature. The relationship is as follows:

$$S.R. = \frac{D_{S.T.} - D_{R.T.}}{S.T. - R.T.},$$

where S. R. is Stiffening Rate, $D_{S.T.}$ is the deflection value corresponding to the Stiffening Temperature, $D_{R.T.}$ is the deflection value corresponding to the Rigid Temperature, S. T. is the Stiffening Temperature, and R. T. is the Rigid Temperature.

The results for the three plasticizers used in this work are shown in Table I.

Discussion

This method for studying low temperature flexibility has proved very useful to us, particularly in the comparisons of effects of different plasticizing systems. As an operating procedure, it permits more work to be done per man-hour than any other method we know, and gives results which, we feel, approximate closely practical service conditions. We have found, further, that as the operator becomes more familiar with the method, accuracy and reproducibility can be sharpened.

However, we do not attempt to read the curves any closer than the nearest 5°F., and duplicate tests have shown that an accuracy of ± 5°F. is readily obtainable. It is probably possible to refine this further if desired, but it is our feeling that in cold tests on compounded vinyl resin products, for example, there are other factors, such as variations in film thickness and compounding, which provide limitations of accuracy.

Most previous reports on cold tests run on plastic products show only one figure as representative of any one product, and most often this is the cold crack temperature. We believe from our work that the stiffening temperature is at least as significant a characteristic, is readily and accurately determinable, and should be reported along with the cold crack (or Rigid Temperature) value. As we pointed out before, the Stiffening Temperature probably relates most closely to desirability from the customer's point of view.

Moreover, by using both the Stiffening Temperature and the Rigid Temperature values, information about the Stiffening Rate can be derived. This important characteristic should not be overlooked, and it is widely recognized that the best products are those which are the least affected by changes in temperature. The Stiffening Rate is a measure of the degree to which products are affected by temperature changes, and, as can be seen in Table I, is markedly affected by the nature of the plasticizer.

It is clear that vinyl chloride resins plasticized with dioctyl sebacate (S. R. values of 1.9 to 2.1) are much less affected by temperature changes than stocks plasticized by either dioctyl phthalate (S. R. values of 3.1-3.5) or tricresyl phosphate (S. R. values of 3.5-3.9).

It is therefore important to point out that the proper selection of plasticizers is a prime necessity where good low temperature properties or the minimum change in properties with change in temperature are desired. Occasionally one hears in the trade the casual remark that if better low temperature properties are desired, it is only necessary to add more plasticizer, the type being of secondary importance. The table shows the fallacy of this. A simple examination of the results demonstrates clearly that increasing the concentration of tricresyl phosphate or dioctyl phthalate within any practical limits would never achieve the clearly superior low temperature performance of dioctyl sebacate.

Summary

1. A practical method for determining the low temperature flexibility characteristics of non-rigid plastics

TABLE I—SIGNIFICANT FEATURES OF PLASTICIZERS TESTED

Plasticizer Concentration (Parts)	Rigid Temperature (°F.)	Stiffening Temperature (°F.)	Stiffening Rate
	Tricresyl Phosphate Plasticizer		
35	+50	over +70	—
50	+15	+55	3.9
65	−5	+40	3.5
	Dioctyl Phthalate Plasticizer		
35	+15	+60	3.4
50	−30	+20	3.1
65	−50	−5	3.5
	Dioctyl Sebacate Plasticizer		
35	−25	−45	2.1
50	app −80	0	app. 1.9
65	below −80	−40	—

and elastomers is described. It has the following special features: (a) It shows the changes in flexibility over a wide range of temperatures; (b) It permits large numbers of samples to be run simultaneously; (c) It avoids contact between the samples and liquids which might affect the results, and (d) It avoids handling or mechanical factors which might produce undue temperature fluctuations in the samples during test.

2. The desirability of using more than one criterion of cold temperature performance is shown, and the following criteria, which may be obtained directly from the test, are suggested as of value: Stiffening Temperature, Rigid Temperature, and Stiffening Rate.

3. The effects of plasticizer type and concentration on low temperature performance are shown, using tricresyl phosphate, dioctyl phthalate and dioctyl sebacate. It is demonstrated that the type of plasticizer is of prime importance in determining low temperature performance.

The Problem of Rubber in Aircraft

THE role of rubber in aircraft of all types, particularly military aircraft, is one of increasing importance. All types of rubber—natural and synthetic—are under constant surveillance by the Air Materiel Command which is hopeful of some day developing an elastomer which will incorporate the best features of all known rubbers. Special interest is being placed on some of the new fluorocarbon compounds. The need for new elastomers is indicated in the following data from a recent issue of the *Technical Data Digest*, the monthly journal issued by the Central Air Documents Office (Army-Navy-Air Force):

Postwar aircraft designs which enable planes to fly at extreme altitudes and speeds are forcing airplane engineers to re-examine plane materials to determine whether they will still be satisfactory under more severe conditions. One major problem is the use of rubber and rubber products. Industry and Air Materiel Command researchers in the Engineering Division's Materials Laboratory have concluded that presently available natural and synthetic rubbers will not be able to take care of all future aircraft needs. It is for that reason that the Materials Laboratory has placed research and development contracts with several firms in the rubber industry, hoping to find new members of the rubber family which will be able to stand up under the extreme conditions.

Present research is primarily directed toward finding out whether new fluorocarbon compounds can supplement such base polymers as Buna-N, Buna-S, Butyl, Neoprene, Thiokol and Silicone. Project engineers C. E. Jaynes, E. R. Bartholomew, and Capt. W. H. Ebelke report definite progress is being made along this line. To date many synthetic rubber samples have been produced from the fluorocarbon family, but as yet no polymer which can be expected to fulfill future requirements is in the immediate offing.

Aside from the fact that this country's natural rubber supplies tend to become short in an emergency, regardless of stockpiles, most modern planes need far more than natural rubber. As Mr. Jaynes puts it, "If it had to be done, our present planes could fly without natural rubber. But we probably couldn't keep them in the air without synthetics." As a matter of fact, the nation's whole economy is becoming more and more dependent on synthetic rubber. In 1939, for example, the U. S. consumed 592,000 tons of natural and only 1750 tons of synthetic. By 1945 we used a mere 105,000 tons of natural as against 693,000 of artificially manufactured rubber. This trend continued into the postwar years, even though the natural product was again coming in from the Dutch East Indies and Malaya. Thus, in 1947, this country consumed 562,000 tons of natural and 559,000 tons of synthetic.

The ideal rubber product, from a materials engineer's point of view, should have the following characteristics: It should have good fuel, oil, ozone, chemical, solvent, fire, and water resistance. It should be serviceable at high and low temperatures. And it should have good strength, elasticity, and resistance to permanent deformation. No one rubber product, natural or synthetic, has all these features. Natural rubber, for example, has good toughness, elasticity, abrasion, and low-temperature qualities; unfortunately it swells badly when exposed to fuels and oils and therefore cannot be used in aircraft fuel systems effectively.

Buna-S has good abrasion and tensile properties. It was developed as one of the best substitutes for natural rubber and consequently has many possible aircraft applications. Thiokol has exceptional fuel resistance but poor ability to overcome permanent deformation. It is therefore not desirable as a packing material in hydraulic or fuel systems or in gasoline hose. Thiokol, however, is very useful in fuel tanks. Buna-N also has good fuel resistance and can therefore be employed in fuel tanks and refueling hose where other rubbers cannot. One other advantage of Buna-N is that it can be compounded to give fair low-temperature properties.

Neoprene is highly satisfactory in tires due to high heat build-up during use. But its fuel resistance is rather limited and it therefore cannot be used effectively in oil systems. It is advantageous in weather stripping, door seals, hose covers, and life rafts because of its resistance to weather deterioration and certain other properties. Butyl has good weathering properties but lacks fuel and oil resistance and therefore has only limited application to items used in aircraft. It has an exceptionally low permeability rate, i.e., it is highly resistant to the passage of air. That, coupled with certain other characteristics, make it better than natural rubber for use in automobile tire inner tubes. Silicone has very poor tensile properties and abrasion resistance but is useful in some applications throughout the—120° to 600° F. temperature range. Most of the other rubbers deteriorate too rapidly for prolonged use above 300°F. Silicone is therefore often found as a gasket material in hot jet engines or in similar applications.

It can therefore be seen that no one rubber satisfies all requirements, even for present needs. Materials Laboratory and rubber engineers have tried blending two or more rubber products to get the best features of each, but experience has shown that they always come out "with all of the bad characteristics and few of the good." One thing is certain. When the time comes that a super rubber can be made from fluorine and carbon, it will help Air Force planes fly higher, faster, and longer, with few maintenance checks on rubber items.

Editorials . . . . . .

More Confusion

FOR the past few months all signs pointed to the early release of the rubber manufacturing industry from over-all controls. There were definite indications from Washington that such a move could be anticipated. Statements issued by various officials concerned with different aspects of the rubber situation encouraged the belief. The optimism was based on the mounting production of synthetic rubber, continued shipments of natural rubber on a record scale, reports that the government stockpiling program was rapidly reaching its scheduled figure, easing of controls to provide more rubber for smaller manufacturers, removing controls on latex consumption, etc.

All of the mounting optimism has been knocked into a cocked hat by the latest report on rubber which was issued on September 4 by the Preparedness Subcommittee of the Senate Armed Services Committee, full details of which are given elsewhere in this issue. In this report, the ninth to be issued by the subcommittee and the third dealing with rubber, the subcommittee deplored the current status of the rubber stockpile and charged that less than 20 percent of the desired national reserve of natural rubber was obtained during the first year of the Korean war, the fiscal year ended last June 30. It termed rubber stockpiling progress as "entirely inadequate" despite the fact that the amount secured in the last fiscal year "represents the highest rate of acquisition by purchase in any fiscal year to date."

In view of the "inadequacy" of the rubber stockpile, the subcommittee urged large-scale expansion of synthetic rubber production, which provides substitutes for many military and civilian rubber uses; intensification of natural rubber production in the Western Hemisphere; greater conservation efforts, and stepped-up research activities. Although the subcommittee's report blamed government officials for the most part for the stockpile situation it also intimated that pressure groups from the rubber manufacturing field were in part responsible for "a less aggressive stockpiling program." This latter reference was tied to the fact that NPA provided more rubber to the industry last April.

What are the facts? Unfortunately only a handful of government officials and legislators are aware of them. The term "unfortunately" is used because if the facts were known to industry there would be far less confusion and far less conflict between the industry and the government. Since practically every control move is governed by the status of the strategic rubber stockpile, would it not be appropriate to reveal the current status of that stockpile and the eventual goal? As we have stated in these columns before, the rubber industry is fully aware of the need for national security, more so than most other industries, and a clear understanding of the situation would put manufacturers in a better frame of mind to accept controls which on the surface appear unnecessary.

Stockpiling tonnage has been and continues to be a closely guarded military secret. As previously indicated, guesses range from 500,000 to 1,000,000 tons, the latter figure based on statements made by prominent rubber executives that there is now sufficient stockpile of natural rubber to fight a five-year war and assuming an annual requirement of 200,000 tons of natural rubber. According to a report in a recent issue of the *Akron Beacon Journal* one nameless rubber executive figures it this way: The stockpile now contains 730,000 long tons. This amount plus 64,000 tons held by industry plus 152,000 tons afloat makes for a total amount of 946,000 long tons of natural rubber which can be considered as stockpile. If imports continue to average 65,000 tons a month, that figure will rise to 1,106,000 long tons by the end of the year.

The figures cited above may or may not be within the realm of accuracy. Our contention is that there is no basic reason for hiding the current status and eventual goal of the rubber stockpile. From whom are we guarding the information? The Russians? The rubber producers in Southeast Asia? The domestic rubber manufacturing industry? The public? It would be folly to assume that the Red strategists could not name the current stockpile within a thousand tons. Producers, too, could come quite close to the actual amount. The domestic industry can only guess and question the need for continued controls. The public, in its usual lethargic manner, is hardly concerned. Only the lack of tires for their vehicles is of any major importance.

The domestic rubber manufacturing industry has cooperated closely with the government on all grounds of national security. It has accepted restrictions and regulations without fully understanding the real need. It is prepared to continue its cooperation, despite this lack of understanding. As Jess Larson, General Services Administrator, recently stated, if it is necessary "our rubber industry can forego some of its present high rate of production in order that our stockpile acquisitions might be accelerated." True, but is it necessary?

CURRENT NEWS OF THE MONTH

NPA LIFTS CURBS ON NATURAL RUBBER LATEX; EASES CONTROLS OVER NATURAL AND SYNTHETIC

IN AN amendment to Order M-2, dated August 29, the National Production Authority lifted its curbs on the use of natural rubber latex and eased its controls over use of natural and synthetic rubber. The agency also told tire and rubber companies that it is likely they will get rubber allocations in the first quarter of 1952 on the "basis of need." This would be made possible by increased production of synthetic rubber in the government-owned plants. Rubber allotments for passenger car tires currently are based on 90% of pre-Korea use. NPA told members of the Industry Advisory Committee they anticipate new rubber consumption in the first half of 1952 at 747,000 long tons. This would compare with 609,000 long tons in the first half of 1951 and 1,258,557 in 1950.

The improved supply of synthetic rubber may permit a sweeping change in control procedure, NPA said. As a result, it is asking tire and rubber companies to submit estimates of their first-quarter 1952 rubber needs. If the total of these estimates is not "excessive," the new plan will go into effect. Otherwise, NPA said, the present control system will be continued.

The newly revised Order M-2 states that controls on natural rubber latex are no longer needed because demand "has declined steadily in recent months." The order also removed restrictions on users' inventories of tires and tubes and raised the limit on manufacturers' inventories of synthetic rubber from 20 working days to 30. In addition, the order permits manufacturers to maintain a full 60-day inventory of natural rubber. The previous limit was 30 days. The requirements for the production of camelback were also simplified.

Total Use Curb Unchanged

NPA left unchanged, however, its curbs on total consumption of rubber other than latex. Producers of consumer durable goods, like replacement tires and tubes, hose, bathing caps, toys and some clothing are allowed to use rubber in any quarter at a rate of 90% of their average quarterly use in the year ended June 30, 1950. Producers of all other rubber products—generally of an industrial or medical nature—are allowed a quarterly rubber use of 100% of their base period consumption under the terms of the new order.

The now abolished latex use curb was not overly restrictive. Up to the date of the amendment, manufacturers could consume in any quarter 25% of the natural latex they used in the year ended June 30, 1950. This permitted a rate of use equal to 100% of the base period.

The change allowing manufacturers a full 60-day inventory of natural rubber will permit manufacturers now operating on a hand-to-mouth basis to build their stocks to a more comfortable level, NPA said. In raising manufacturers' allowable inventories of synthetic rubber from 20 to 30 working days, NPA said the increase was necessary to give rubber companies a more flexible inventory margin. The move was justified in view of increased synthetic rubber supplies, the agency said.

Inventory Restrictions

The increased output of both tires and tubes, NPA said, likewise justifies the removal of restrictions on inventories in the hands of distributors and users. Previously, operators of truck and taxi fleets, as well as wholesalers and retailers, were limited to a 30-day supply of tires and tubes. In the case of passenger car makers, it was a 15-day limitation.

One feature of the August 29 amendment is the elimination of an "escape clause" present in an earlier revision of Order M-2. This permitted manufacturers to use larger proportionate quantities of natural rubber than permitted by NPA specifications.

If a manufacturer did not get adequate supplies of synthetic rubber to turn out his usual line of articles at the permitted level, NPA allowed him to incorporate in a given product more than the specified amount of natural rubber. NPA said, however, many manufacturers had been taking advantage of this clause.

Production and availability of synthetic rubber has now improved to such an extent that manufacturers are able to comply with specifications and still maintain permitted levels of output. This will serve to "improve the government's stockpile of natural rubber and at the same time reduce consumption," NPA said.

Meanwhile, W. Stuart Symington, Administrator of the Reconstruction Finance Corporation said he "hopes to have a plan as soon as possible" to turn over the government's synthetic rubber plants to private industry. Mr. Symington said he is working on such a plan with leaders of the rubber industry, but it is up to the Congress to decide whether the government should retain ownership during the present emergency. The law under which the RFC operates the $750,000,000 industry expires in July, 1952.

Mr. Symington said he doesn't think the plants "can be sold piecemeal." Any plan developed, he said, should provide for selling raw material feed-stock plants along with those making the rubber. He said a disposal plan would involve safeguards to prevent a private monopoly in synthetic rubber.

President Truman has asked the National Security Resources Board to canvass administrative agencies for recommendations on disposing of the industry, which the law requires be put before Congress next January. The President asked for disposal authority two years ago, but Congress turned him down.

Any disposal plan, Mr. Symington said, must give small companies, and others not already involved as contract operators for RFC, "equal opportunity" to buy the plants. RFC, he added, wants to sell the plants at a price "under which private industry could operate at a profit and yet fair to the taxpayer."

Any plant sold, he said, would "certainly" be subject to a reserve clause under which the Government could take them back in times of emergency. Mr. Symington pointed out, however, that a number of industries operated their own defense plants during war.

U. S. Synthetic Sales

He said the Government is now selling about $450 million of synthetic rubber a year and that current expansion plans may mean a price increase because of limited supplies of cheap raw materials. He said the price will come down later as production of oil extended synthetic rubber is increased.

Mr. Symington disagreed with some industry spokesmen who have called for a halt to exclusive buying of natural rubber in order to get the price down. He said he did not think a price drop in natural rubber would result because "you don't get true costs in an expansion program."

He expressed confidence that current improvements in synthetic rubber will result in a price which will be permanently competitive with natural rubber, which is

still preferred for some uses. Synthetics now are "equal or better" than natural rubber in almost all uses, he said.

Boosts "Cold Rubber" Output

The government has also decided to increase its output of "cold rubber" to 75% of the entire GR-S production. Slightly more than 50% of the present approximately 64,000 tons a month production of GR-S is "cold rubber." However, NPA Administrator Manly Fleischmann has told the RFC to boost "cold rubber" output to a monthly rate of 53,770 tons, or 75% of the 71,720 ton capacity under the government's GR-S expansion program. The NPA directive was disclosed in an exchange of letters between Mr. Fleischmann and Mr. Symington.

Mr. Symington, in an earlier appearance before a House Appropriations subcommittee, said he believes "the natural rubber people may have written themselves out of the rubber market forever" by boosting prices and forcing development of the American synthetic rubber industry. Other criticism of the natural rubber producers came from Jess Larson, head of the General Services Administration. Mr. Larson urged that the synthetic rubber industry be maintained as a hedge against the capricious rubber market. Already American industrialists are opposing long-term rubber contracts because they believe a perfect synthetic may be developed at any time, Mr. Larson said.

However, rubber producers and dealers in Malaya say they aren't worried over American warnings that high prices for rubber are pushing them out of the world market. But they concede that the next two years may be difficult ones for the industry, partly because of the increased rate of synthetic rubber output in the United States. Malaya's rubber men argue, however, that in the long run the consumption of natural rubber in the U. S. and elsewhere in the world is bound to rise.

C. P. Liston, a leading European rubber broker, said recently that "only time will show how far Mr. Symington's statements are true to actual facts." He, like others, contended the American accusations are "most unjustified." Rubber men pointed out that while America maintains she could do without natural rubber from Malaya, she is busily engaged in making agreements for bulk buying of crude rubber from Thailand, Ceylon, or Indochina.

Explosion at Butadiene Plant

Explosions and fire on September 1 idled the government-owned Plains butadiene plant operated by the Phillips Chemical Co. at Borger, Texas. However, damage at the plant is much less than originally anticipated according to Phillips officials. A large part of the plant will be back in operation by mid-September and the balance will be operating as soon as certain tanks, motors and controls can be obtained and installed. The synthetic rubber plant adjacent to the butadiene plant will continue to operate without interruption.

Eleven employees were injured in the first blast which rocked the plant. All were burned or cut, but none was hurt critically. All are out of danger and making a satisfactory recovery. It was further stated that the loss to the government as a result of the explosion and fire has been held to a minimum.

(EDITOR'S NOTE: According to a statement issued by Senator Johnson, the Borger explosion is expected to result in a loss of 20,000 to 50,000 tons of synthetic rubber. According to a reliable rubber source, however, the loss is not expected to run over a total of 10,000 tons, approximately 3,500 tons of which will be lost in the month of September).

The government, meanwhile, has exempted from price control all butadiene derived from non-petroleum sources when it is sold for use in the making of synthetic rubber. The exemption was declared in Amendment 2 to General Overriding Regulation 3, effective August 25, as promulgated by the Office of Price Stabilization.

Category Pricing Asked

Members of the Mechanical Rubber Goods Industry Advisory Committee at a meeting with OPS officials on August 14 recommended that their industry be permitted by amendment the option of pricing their products category by category under the Manufacturers' General Ceiling Price Regulation, CPR 22.

Under the terms of Amendment 21 to CPR 22, manufacturers still under the General Ceiling Price Regulation, GCPR, have the option until further action by OPS of pricing either under GCPR or CPR 22. However, if they elect to apply CPR 22 to any of their products they must apply it to all of them subject to CPR 22.

Committeemen reported that cost increases vary widely from one category to another and that hardships were being experienced in certain categories. Because CPR 22 would result in mixed rollbacks and rollforwards throughout the industry, long line companies were standing on their GCPR prices until the price situation is clarified. This has prevented single line companies in squeeze categories from taking advantage of rollforwards under CPR 22 because of price competition from companies maintaining their old prices. If application of CPR 22 was permitted by categories, committeemen said it would tend to relieve such situations.

The committee discussed pricing of rubber hose. Under CPR 22 there would be mixed rollbacks and rollforwards in the 23 product lines. The question was explored whether a manufacturer now under GCPR, in the interest of price stability and anticipating CPR 22 would ultimately be obligatory, could sell below his GCPR ceiling and at the same level as his CPR 22 ceiling without putting CPR 22 generally in effect. Committeemen requested a clarifying ruling on this point.

Subcommittee Expresses Preference

Members of the Molded, Extruded and Lathe-Cut Rubber Goods Subcommittee of the Mechanical Rubber Goods Industry Advisory Committee at their fourth meeting with OPS officials on August 28 expressed preference for the comparison product pricing method for their custom made items.

The industry is covered by the Manufacturers' General Ceiling Price Regulation, CPR 22. Under SR 10 to CPR 22 items whose volume in the second quarter of 1951 amounted to less than $10,000 in value were left optionally under the General Ceiling Price Regulation, GCPR, until September 30, 1951.

Extension Suggested

Committeemen said they would be satisfied to continue pricing as at present and suggested that the provisions of SR 10 applying to their items be extended beyond September 30. There was some discussion whether the volume limit should be $10,000 as at present or something less per quarter.

Committeemen recommended that if their industry is taken out from under GCPR and CPR 22 by a special tailored regulation, comparison pricing devices such as are available to them under these regulations be incorporated in the tailored regulation. There was some discussion of formula pricing as an alternative, with ceilings determined on the basis of costs plus base period margin, but the comparison product method appeared to have preference.

Rubber Highways Standing Test

According to latest reports, rubber highways and playgrounds installed in Akron, Ohio five years ago are withstanding quick freezes and thaws. There is about 5 to 7½% of ground rubber in the road mixture, the rest being asphalt and other materials. On test strips, where asphalt and rubberized paving are laid side by side, the rubber portions have held up well. It will take another five years, however, to see how much better the rubberized roads are than asphalt, experts said.

Plant Maintenance Show Planned

The Plant Maintenance Show, newest of the giant industrial expositions, will next be held at Convention Hall in Philadelphia., Penna., on January 14 through 17, 1952. The displays are expected to cover an area almost four times that of the first show, held in 1950. More than 200 companies are expected to participate. Concurrently with the show, the Plant Maintenance Conference also will be held. The last conference drew audiences of 1,700 at a single session and is one of the best attended annual technical conferences in the country. Advance registration cards and hotel information may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York, N. Y.

COLLYER ASKS "DESOCIALIZATION" OF RUBBER INDUSTRY IN AMERICA

Declaring that the rubber industry in the United States is today completely "socialized" in the fields of rubber supply and usage, John L. Collyer, president of the B. F. Goodrich Company, has called for appointment by the President of a special commission to study the problem and develop a policy of competition in rubber "in keeping with the traditions and principles underlying both our domestic and foreign policies."

In advocating the appointment by the President of a special commission to study the problem and develop a policy for the consideration of the President and the Congress, Mr. Collyer said the commission should be "of the character of the Baruch Committee." The Baruch Committee, which included Dr. Karl P. Compton and Dr. James B. Conant, was appointed by the President in 1942 to make recommendations on the then critical rubber situation.

In making recommendations to the government, Mr. Collyer, one of the earliest advocates of establishing large scale facilities for producing man-made rubber in this country, urged that "at the end of the present emergency the government take steps to 'desocialize' this major industry by selling or leasing to private industry the American rubber plants it now owns. The present Rubber Act became law on April, 1948, and will expire June 30, 1952."

Rubber in Unique Position

"As a result of two wars in ten years," he said, "the rubber products manufacturing industry now finds itself in an unique position among major industries. Government owns the rubber producing plants, procures the raw materials and schedules production, is the only buyer and importer of crude rubber, determines the amounts of rubber that may be consumed by manufacturers, sets the specifications for the use of rubber, and determines the price."

According to Mr. Collyer, socialization of rubber has been tolerated by the American people only because it was dictated by military security and not by a clearly defined policy. However, he added, the goals of accumulating a stockpile of natural rubber adequate to meet the nation's military and essential civilian requirements for a five-year war and the reactivation of the man-made rubber industry capable of producing more than a million tons of rubber a year have been achieved.

Because of this situation, Mr. Collyer recommended that the government establish a time table for accomplishing the following:

(1) Termination of government control of crude rubber purchasing.

(2) Termination of government control over consumption of rubber for civilian purposes.

(3) Accumulation of a stockpile of 200,000 long tons of American-made rubber for the purpose of military security.

(4) Limitation of active government participation in the field of rubber to the maintenance of strategic stockpiles after accumulation of the stockpile of man-made rubber has been accomplished.

(5) A clear-cut statement of policy to be issued by government assuring both producers and consumers of rubber that the strategic stockpiles of crude and man-made rubbers will be employed only for the purpose of military and essential civilian security and will, under no circumstances, be used to manipulate rubber prices.

"Competition between crude and man-made rubbers at home and abroad is a natural and desirable consequence of private ownership of synthetic rubber-producing facilities," Mr. Collyer said. "This competition will benefit not only rubber consumers the world over, but also rubber producers."

In his rubber study, presented to government officials, Mr. Collyer urged that the United States refuse to participate in any international rubber cartel and vigorously oppose the formation of such a cartel by rubber-producing or rubber-consuming nations. However, he declared that the United States, the largest rubber-consuming nation, should encourage world-wide interest in the development of more efficient methods for the production of natural rubber and for increasing its usefulness.

Rubber Road for Washington, D. C.

The Highway Department of the District of Columbia has revealed that experiments will soon be initiated on various types of rubber asphalt on the streets of Washington. The test project will get under way as soon as the 1952 appropriation bill is signed by the President. Natural, reclaimed and synthetic rubbers will be used in the tests. Each will be added to sheet asphalt and sand asphalt mixtures.

Chemical Exposition News

News of the 23rd Exposition of the Chemical Industries reflects the great industrial expansion in the industries dependent upon chemistry or the application and use of chemical products. The needs for the products of these industries are tremendous and their needs for machines, equipment instruments, materials, services, technical products are increasing vastly. These are the products which will be shown in more than 400 exhibits at the exposition in Grand Central Palace, New York City, from November 26 to December 1, filling all four floors to capacity. Among the many interesting products being shown, a new coating intermediate is being offered. It is one of the fast-growing family of silicones, already productive of special lubricants, rubber substitutes and a significant group of resins. Of particular interest will be the displays of processing and laboratory equipment.

SAE National West Coast Meeting

The Society of Automotive Engineers at its National West Coast Meeting held on August 13 through 15 at the Olympic Hotel in Seattle, Wash., heard a number of interesting papers on tire care and maintenance. J. R. Schmitt, supervising fuel and lubricant engineer for the Standard Oil Co. of California presented a paper on "Effect of Tire Mismatching on Lubricant Performance and Maintenance Cost of Worm Final Drives". His paper endeavored to show the causes for lower mileage and more costly operations and to explain methods of correction. H. M. Place of the U. S. Rubber Co. presented a paper on "Why Dual Tires Do Not Stay Matched". Mr. Place's paper attempted to spread information which may be helpful to operators of vehicles utilizing dual tires.

NEW GOODRICH CHEMICAL POLYVINYL CHLORIDE PLANT STARTS PRODUCTION

Production has started at the recently completed polyvinyl chloride plant of the B. F. Goodrich Chemical Co. at Avon Lake, Ohio. Covering seven acres of the company's 225 acre tract, the plant consists of two large buildings—a three-story process building (right), and warehouse (left). The new manufacturing facilities will produce Geon polyvinyl chloride resins, supplementing production of the company's plants at Louisville, Ky., and Niagara Falls, N. Y. Construction of the Avon Lake plant began in 1950 and was completed in record time. D. L. Matthews is manager of the new Goodrich Chemical plant at Avon Lake.

SENATE SUBCOMMITTEE URGES SPEEDIER ATTAINMENT OF STOCKPILE

On September 4, the Senate Preparedness Subcommittee urged greater "sacrifices" by rubber manufacturers to speed realization of the natural rubber stockpile goal. It also urged an immediate start on building additional facilities for making butyl. The group, a subcommittee of the Armed Services Committee, urged the government to put up another 30,000 to 50,000 tons of butyl capacity. Production, all government-owned, is now running at capacity—80,000 tons a year.

The subcommittee, headed by Senator Lyndon Johnson (Dem., Tex.), deplored a decision which it said was forced on the Munitions Board last April to reduce the stockpiling rate to make more crude rubber available to manufacturers of civilian goods. The consumption increases, which the group blamed on industry pressure, were ordered by William H. Harrison, then head of the Defense Production Administration. The increases "jeopardized early achievement of the stockpile objective," the subcommittee charged.

The committee warned DPA and the National Production Authority against being "pushovers" for industry's views and expressed its conviction that Manly Fleischmann, who now heads both agencies, is the "hard-headed" administrator to resist such pressures to ease rubber curbs.

It urged NPA to eliminate more nonessential rubber products, or at least deny natural rubber for toys and golf balls, and to further reduce the natural rubber content of tires for cars in the Cadillac class. It praised NPA for channeling more rubber into truck tires and other scarce essential items and urged that this policy be extended.

Rubber Policy Consolidation

Prompt consolidation of rubber policy determinations under Reconstruction Finance Corporation Administrator W. Stuart Symington was urged as a means of ending what remains to be achieved in developing a coordinated rubber program. The committee found that "to many of our nation's leaders, a rubber program is still something to be hammered out by the conflicting interests of private pressure groups. We believe this attitude must cease."

The committee said it favors continued Government ownership of the synthetic rubber industry "under present conditions." It noted that a "technologically progressive" synthetic rubber industry has been achieved under the current rubber policy act which comes up for renewal or revision next June.

It recommended "development of definite plans to exchange American-made synthetics for natural rubber owned by friendly nations whenever synthetic is available for export." It said this should take precedence over building up heavy domestic inventories of synthetics. Also urged was the "cooperative development" of plans to assure our Allies, in Europe and elsewhere, enough rubber to keep their factories operating if Far East sources are cut off. It urged recognition of "global strategic considerations" in developing plans for a world pool of natural rubber and additional facilities to produce synthetics for friendly nations.

The committee said exclusive buying of natural rubber by the Government "should continue" along with consumption restrictions as "necessary steps in the curbing of inflation and lowering the cost of the stockpiling program to the taxpayer." It said the decision to allow reactivation of 7,500 tons a year of West German synthetic rubber production is "proper" in light of Western Europe's needs and Germany's economic recovery. Germany's output will reach that rate in January.

The subcommittee stressed the importance of pressing research programs aimed at making this country "forever" free of "any significant dependence on natural rubber." It also urged production of domestic natural rubber in greater tonnages than possible in pilot plants and laboratories. It called upon Congress to make the money available in full.

Issues Second Statement

On September 6, Senator Johnson issued a statement to clear up the "confusion" over what the Preparedness Subcommittee meant when it called for speedier stockpiling. The Senator said that his group does not want the government to embark on a "wild buying spree" to attain the natural rubber stockpile goal. Some of the confusion, he said, may have been "created deliberately." The natural rubber market rose sharply after the report was published.

The Senator said Government stockpilers "could and should" be able to step up the rate of stockpiling without "increasing the rate of our buying from natural rubber producers in Southeast Asia." He said increased production of synthetic rubber, the elimination of non-essential items using natural rubber and substitution of synthetic for natural rubber "wherever feasible" in manufactured goods "would permit the release to our stockpile of natural rubber now in our possession or on its way to this country."

Scores Defense Agencies

Natural rubber is bought exclusively by the General Services Administration both for the stockpile and for resale to meet industry's needs. The subcommittee scored defense agencies for succumbing to industry pressure to channel more to consumers at the expense of the stockpile, beginning last April.

In a "restatement" of the sub-committee's position, Senator Johnson said: "We are urging the aggressive stockpiling of natural rubber until the nation's stockpile goal has been attained. However, we are not calling upon Government officials to go out into the market place on a wild buying spree."

His statement backed up remarks made to a reporter by the subcommittee's chief counsel, Donald C. Cook, that the Government should avoid bidding up world prices in speeding up its natural rubber buying program. Mr. Cook said the watchdog group favors a policy of buying only the "available" supply on a "sensible, businesslike basis." GSA has been virtually out of the market in recent weeks because world prices, after falling in the late spring, had steadied at about GSA's 52¢-a-pound resale price.

The market rose to 56¢ after the subcommittee released the earlier report calling for faster stockpiling and tougher controls on rubber consumption.

Corning Glass Names Condon

Corning Glass Works, Corning, N. Y., has appointed Dr. Edward U. Condon, now director of the National Bureau of Standards, as director of research. Prior to his appointment to his present position by President Truman in 1945, Dr. Condon spent eight years as associate director of research for Westinghouse Electric Corp., where he directed radar research. He has during his service with the Government worked on atomic physics, guided missiles, proximity fuses and electronic computers. He is a member of the National Committee on Aeronautics, of the Scientific Advisory Committee of the Brookhaven National Laboratories, working on atomic research, and of the Senate Advisory Committee on Color Television. He also serves on scientific committees for Harvard and Princeton.

Monsanto Backs Japanese Firm

The Japanese Government's Foreign Capital Commission has just approved the contract signed between the Monsanto Chemical Co., St. Louis, Mo., and the Nippon Kasei Co. for the establishment of a new company in Japan for the manufacture of vinyl chloride. The two companies are to make investments in kind on a 50-50 basis. The new company, which is expected to be known as Monsanto-Kasei, will be capitalized at ¥1,200,000,000 (official exchange rate is ¥360 to $1). The new enterprise will begin production at the Yokkaichi and Nagoya plants of the Nippon Kasei as soon as the organizational procedures are completed. The company is expected to be formally inaugurated by October of 1951, at the latest.

Diamond Alkali Plant Expansion

A two-year, multi-million dollar program of expansion at the Painesville, Ohio, plant of the Diamond Alkali Co. was announced recently. The project embraces enlargement and modernization of present facilities which will enable the company to step-up output of caustic soda and chlorine substantially by the electrolytic method. It also includes construction of a new plant for producing perchlorethylene, a chlorinated hydrocarbon solvent whose industrial applications have zoomed in recent years.

JOHN J. HAGER, formerly associated with the B. F. Goodrich Co., has joined the staff of the Pioneer Latex & Chemical Co., Middlesex, N. J., where he will be in charge of the development and sale of adhesives and products sold to the automotive trade.

RFC ANNOUNCES 1½c PRICE RISE ON GENERAL PURPOSE SYNTHETIC

The Reconstruction Finance Corp., on August 27, announced a 1½c a pound increase in the selling price of GR-S. The price rise is effective with September deliveries. Previously, GR-S had sold for 24½c per pound. W. Stuart Symington, RFC Administrator, said the price rise had been approved by the Office of Price Stabilization. He explained the increase was necessary because of RFC's current program of expanding the output of synthetic rubber.

The program to boost GR-S ouput from 760,000 to 860,000 long tons a year will require use of high cost alcohol-butadiene made at government plants in Kobuta, Penna. and Louisville, Ky. Production of this type of GR-S will result in a 35 to 40c a pound GR-S. The new selling price of 26c a pound for standard GR-S and most grades of GR-S latex, is determined by striking an average of the costs entailed in producing the 860,000 tons from alcohol-butadiene as well as the cheaper petroleum butadiene. Cost of the rubber from the latter is about 18½c a pound, RFC's selling price up to last December 6, when the use of alcohol-butadiene forced the agency into a 6c a pound increase in its selling price.

The price of GR-I will remain unchanged at 20¾c a pound, the price established last December when it was raised from 18½c. RFC produces about 80,000 tons of butyl a year. For the following grades of GR-S latex, the selling price has been boosted from 20¼ to 27¾c a pound: Latex types 5, 6, 7, 8, X-619, X-621, X-635 and X-653.

Effect of Increase

RFC said nothing about what effects the price increase might have. But for an average automobile tire, which takes from 10 to 11 pounds of synthetic, the boost can be expected to add from 15 to 16½c to production costs per tire. RFC emphasized that the agency sells rubber to industry at cost and does not accumulate a profit. The increased price reflects the jumps in cost.

A spokesman for the U. S. Rubber Co. in commenting upon the price rise stated: "We are not surprised that the RFC finds it necessary to increase the price of synthetic rubber. It is simple arithmetic that when manufacturing costs go up, whether in Government or private industry, the selling price also must rise to prevent deficit operations."

The company added that the boost will mean a "great increase" in the cost of its operations. Whether this increase will be passed on to its customers will have to be determined later and will be subject to OPS limitations, the company said. Rubber firms in Akron would make no formal comment on the synthetic rubber price rise. However, one executive noted that the increase will raise the cost of tires and therefore should be given some consideration by the OPS.

The Rubber Heel and Sole Institute, however, urged the RFC to cancel the increase in the price of synthetic rubber. Dr. Robert A. Winters, executive director of the Institute, said the request was made in the "interest of the government's price stabilization program." The impact of the price increase on the costs of producing rubber heels and soles will be severe, Dr. Winters said. "It is the belief of the members of the Institute that government agencies should take the lead in carrying out the spirit of the price stabilization act," he said.

Growers Help Buy Power

Rubber growers, dealers and manufacturers of rubber goods in Brazil will "chip in" to help bring electric power to the states of Para, Amazonas and other areas in the Amazon. The Advisory Board of the Amazonia Credit Bank, formerly the Rubber Bank, has approved a subcharge of 90 centavos a kilo, or a little more than 2 cents a pound, on the price of rubber for the next four years. The sum collected in this way will be used to finance the electric power. In theory, one third of the total will come from each group.

General Electric Gel-Time Meter

A new gel-time meter, designed to measure the time required for fluid thermosetting compositions to reach a point of rapid viscosity change during polymerization, has been developed by the Special Products Division of the General Electric Co., Schenectady, N. Y. According to company officials, the unit will be an aid in the evaluations of thermosetting compositions used in the manufacture of monomers, resins, varnishes, and other protective coatings. It can also be used in studying effects of such variables as reaction temperatures, catalysts, inhibitors, and quality of the main reactants. The device measures the gel time, a direct function of viscosity drag in the test sample, by means of a rotating spindle suspended from a torsional spring. As viscosity of the fluid being tested increases, it creates an additional drag on the spindle which is immersed in the fluid. At the gel point, viscosity increases very suddenly and the increased drag on the spindle closes a switch which stops the timing mechanism and actuates the electrical indicator of the G-E unit.

Uscolite Yarn-Carrying Quill

A new plastic yarn-carrying quill which will wear two to three times longer than wooden types has been developed for the textile industry by the Mechanical Goods Division of the U. S. Rubber Co. Made of Uscolite, a new rubber-plastic compound, the quill will not splinter, chip or warp. Moisture does not affect it and it has no tendency to soften when run through conditioning agents. It also has high surface friction which gives it good yarn holding properties, officials of the Mechanical Goods Division said.

RUBBER SHIPMENTS TO RUSSIA TRIPLE DURING MONTH OF JUNE

The U. S. Department of Commerce recently reported that shipments of natural rubber from Southeast Asia to Russia almost tripled in June while shipments to Communist China plunged from an average of 13,500 tons a month to 50 tons. In June, Russia received 10,500 tons of natural rubber compared to average monthly shipments of 3,600 tons in the first five months of 1951, according to the department's estimates.

Department officials explained that the rubber received by Russia in June included an extraordinary 6,500 tons from Malaya. It was this shipment, contracted for in the first week of May, which provoked a British embargo on further shipments from Malaya to that country.

The enormous drop in shipments to Communist China, the department explained, was due to the British embargo in May on shipments from Malaya. The 50 tons received by China in June was from Malaya. However, it was contracted for in May just prior to the embargo order. Officials said the remaining 4,000 tons of natural rubber received by Russia in June came from various places other than Malaya, including Belgian and Dutch possessions.

The department's figures show that for the first six months of 1951, Russia imported 28,500 tons of natural rubber. This total is only 1,000 tons more than her total imports in the first half of 1950. Except for the June shipments, Russia's monthly average rubber imports have been considerably lower than in 1950.

For the first half of 1951, shipments to Communist China totaled 67,800 tons compared to only 5,500 tons in the first half of 1950.

British-Russian Trade

Russia, meanwhile, has reserved the right to tear up a new timber contract with Britain unless Russia can use the proceeds to buy British rubber. Sir Hartley Shawcross, president of the Government Board of Trade, said that his country agreed because eastern Europe is "the only available source of supply for many of this country's vital imports."

He conceded that the deal might lead to misunderstanding in the United States. However, he stated that in these trade exchanges, Britain receives as good as she gives, economically and strategically. He also emphasized that it does not necessarily follow that supplies of rubber to Russia will increase nor does it mean that there will be any change in the ban on rubber to Communist China.

Standard Products Plans Plant

Plans for the construction of a $1,000,000 plant in Versailles, Ky., were recently announced by the Standard Products Co. of Cleveland, Ohio. The new plant will contain about 150,000 square feet and employ about 300 persons. The company produces automotive window channels, auto locks, metal stamping, mechanical rubber and plastic products.

RUBBER DIVISION HOLDS 59th MEETING IN CONJUNCTION WITH JUBILEE

The Division of Rubber Chemistry of the American Chemical Society held its 59th Meeting on September 5 to 7 at the Hotel Commodore in New York City. The meeting was held in conjunction with the Diamond Jubilee Meeting of the parent society, held from September 3 to 7. Approximately 850 members and guests registered for the division meeting, which was marked by the presentation of five symposiums, one of which was divided into two parts.

A total of 34 papers were involved in the five symposiums, the subjects covered and the presiding officers being as follows: *Compounding*, A. E. Juve (Goodrich); *Dynamic Properties of Rubberlike Materials*, J. W. Liska (Firestone); *Ozone Cracking*, G. R. Cuthbertson (U. S. Rubber); *Preparation of Synthetic Rubber*, W. B. Reynolds (Phillips Petroleum); *Properties of Synthetic Rubber*, J. D. D'Ianni (Goodyear); *Latex: Natural and Synthetic*, L. A. Wohler (Firestone). Abstracts of all 34 papers presented were published in the June, 1951, issue of RUBBER AGE.

Another highlite of the meeting was the announcement of new divisional officers to serve for 1952, selected by letter ballot. These are: *Chairman*, Waldo L. Semon (Goodrich); *Vice-Chairman*, Seward G. Byam (DuPont); *Secretary*, Charles R. Haynes (Binney & Smith); *Treasurer*, Amos W. Oakleaf (Phillips Petroleum). Regional group representatives to serve as directors of the division for two-year terms included the following:

Connecticut, S. M. Boyd (U. S. Rubber); *Detroit*, G. M. Wolfe (Sharples Chemicals); *Northern California*, R. A. Claussen (Pioneer Rubber Mills); *Philadelphia*, B. S. Garvey, Jr. (Sharples Chemicals); *Rhode Island*, H. L. Ebert (Firestone); *Southern Ohio*, P. O. Powers (Pennsylvania Industrial Chemicals); *Washington, D. C.*, H. L. Fisher (National Research Council). John W. Snyder (Binney & Smith) was chairman of the Teller's Committee, assisted by S. M. Martin, Jr. (Thiokol) and M. E. Lerner (RUBBER AGE). A total of 976 ballots were cast.

25-Year Club Holds Luncheon

The Seventh Luncheon of the Twenty-Five Year Club of the division was held in the East Ballroom of the Hotel Commodore on Wednesday, September 5, with Dr. A. A. Somerville (Vanderbilt) presiding as chairman. Approximately 200 members attended the luncheon, the largest held by the club to date.

The two oldest members present from the point of service, both with more than 50 years of actual experience in the rubber industry, were A. A. Glidden, for many years associated with the Hood Rubber Co. and now acting as a consultant, and W. E. Kavenagh, of the Goodyear Tire & Rubber Co. at Windsor, Vermont. Both received an ovation.

The results of a survey made by the special committee appointed some time ago to determine the proper function of the 25-Year Club were revealed by H. A. Winkelmann (Dryden Rubber), acting for Bruce Silver (N. J. Zinc), chairman of the committee, who was unable to attend the luncheon due to jury duty. It was interesting to note that the survey, in the form of a questionnaire sent to all club members, brought an approximate 58% return.

Although the vote was close in some instances, the membership voted against changing the name of the club, raising the membership requirement from 25 to 30 years, sponsoring any special projects, such as a fellowship at the University of Akron, presenting an award to the retiring division chairman, adoption of dues, or sponsorship of a history of organic accelerators since Oenslager's discovery. It was quite evident from the vote that the members preferred to maintain the club on a strictly informal basis.

The only item on the questionnaire which received an affirmative vote was that suggesting that a token of some kind be presented at each meeting of the club to the oldest member present in point of service, with the token to be awarded once only to any single individual. E. B. Curtis (Vanderbilt) was named chairman of a special committee to determine the nature of the token to be presented. The committee in charge of the survey also decided to recommend to the divisional officers that the full division sponsor the history of organic accelerators.

It was also announced that A. C. Fide (American Zinc Sales) will act as chairman of the 25-Year Club luncheon to be held in Cincinnati in the Spring of 1952 and that H. F. Van Valkenburgh (Dunlop) will act as chairman at the luncheon to be held in the Fall of 1952 at Buffalo. Earl B. Busenburg, 633 Morley Ave., Akron 20, Ohio, is permanent secretary-treasurer of the club.

Active Business Session

The semi-annual business meeting of the division was held at the end of the technical session on Thursday morning, September 6, with J. H. Fielding (Armstrong Tire), the retiring chairman, presiding. A moment of silence was observed in memory of four members who had passed on since the last meeting. These were David C. Scott, Jr., I. P. Maider, R. M. Warner, and L. C. Whittemore.

It was announced that the Spring, 1952, meeting of the division would be held on April 30 and May 1 and 2 at the Netherlands Plaza Hotel in Cincinnati, Ohio, and the Fall, 1952, meeting on October 29-31 at the Hotel Statler in Buffalo, N. Y. Both meetings will be held apart from the parent society, marking the first time that the division will fail to meet with the parent society at least once during a calendar year. It was also announced that regional meetings have been tentatively planned for Los Angeles and Boston in the spring of 1953, with a regular meeting to be held with the parent society sometime in the fall of that year.

Chairman Fielding revealed that the Executive Committee had adopted a number of recommendations made by the new Ways and Means Committee of the division, the latter committee being headed by Arthur M. Neal (DuPont) as chairman. These included empowering the secretary of the division to sign checks in an emergency, increasing the amount of the surety bond carried by the treasurer to match the cash position of the treasury, holding at least one separate meeting a year apart from the parent society, establishing a special Meetings Committee to act as a guidance committee for local arrangements committee, and maintaining *Rubber Chemistry and Technology* on its present basis. No recommendations were made as far as the division's Rubber Library is concerned.

A membership report made by George Vacca (Bell Telephone Labs.), a member of the Membership Committee, indicated that 304 new members had been added to the roster since the last meeting, of which 209 were regular and 95 were associate members. As of September 1, 1951, the division had a total of 2329 members, consisting of 1971 regular and 358 associate members. The circulation of *Rubber Chemistry and Technology*, it was reported, has reached 2816. It was also stated that although the Rubber Division ranks with the Petroleum Division as the two largest A.C.S. divisions, it had lost its status as the largest of such divisions.

Divisional Banquet a Success

The Divisional Banquet, held in the Grand Ballroom of the Hotel Commodore on Thursday evening, September 6, was a successful affair, with approximately 750 members and guests in attendance. It was preceded by the annual Suppliers' Cocktail Party, made possible by contributions received from most of the suppliers to the industry. E. B. Curtis (Vanderbilt) acted as chairman of this year's affair.

The banquet, which was followed by the usual program of excellent entertainment in the form of variety acts, was highlighted by the presentation of the 1951 Goodyear Award to Dr. William C. Geer. The award, which includes a gold medal, a scroll and a $200 honorarium, is the highest honor bestowed by the Rubber Division and is made annually to those who have performed outstanding service to rubber science. The presentation to Dr. Geer was made by Chairman Fielding. Dr. Geer is a former vice-president in charge of research and development of the B. F. Goodrich Co.

A short talk on the Medalist was given by Dr. Harlan L. Trumbull, one of his former associates and who retired recently from Goodrich where he was assistant to the vice-president in charge of research. Dr. Trumbull covered some of the highlites of Dr. Geer's career, including his improvement of gas masks during World War I, his development of a tough golf ball cover, Vulcalock adhesives and de-icer overshoes for airplanes, and, in particular, his work on successful aging tests. He also referred to the recent honor paid Dr. Geer by Cornell University which has established the William C. Geer Laboratory of Rubber and Plastics. In his acceptance of the Goodyear Award, Dr. Geer

expressed his appreciation to all concerned for his selection.

Geer Delivers Goodyear Lecture

Dr. Geer delivered the 1951 Goodyear Lecture at the beginning of the technical session on Thursday afternoon, September 6. Taking as his subject, "Strategy in Rubber Research," Dr. Geer emphasized the point that research work has been subject to strategic planning by executives of rubber companies "in a manner and to a degree not generally recognized." He said that if such strategy had not been employed at the turn of the present century the rubber industry would not have achieved its present status of elaborate research laboratories, highly trained chemists, physicists and engineers, and the large and steady volume of usable results which come from them.

The Goodyear lecturer reviewed the problems which faced the rubber chemist in 1907, when some twenty grades of crude rubber were in daily use. The industry at that time was both simple and complex, he said, simple because the rubber compound was made up by the use of not many more ingredients than were known to Charles Goodyear in 1839, and complex because little was known of the underlying science of the rubber mixture or of the actions and reactions during vulcanization of the ingredients which entered into it. The "compound" was blamed for practically all difficulties. The situation called for strategy, and fortunately it was forthcoming.

Dr. Geer credited strategy with the foundation and growth of the India Rubber Chemistry Section of the American Chemical Society, the predecessor of the Rubber Division, and then told how additional strategy was required to get the consent of corporation officials, including those of the Goodrich company, to invest substantial sums in the construction of research laboratories devoted to fundamental rubber research. Special strategy was required in the latter instance, he said, since it was not possible to predict what new products, if any, such laboratories would produce.

According to the speaker, strategy is but the expression of the thinking of men. Accordingly, he discussed the thoughts and actions of two men with whom he had been closely associated, namely, Bertram G. Work, who was president of the B. F. Goodrich Co. from 1907 until his death in 1927, and Arthur H. Marks, who developed the alkali process of reclaiming rubber. The mark both of these men left on the rubber industry was outlined. Mr. Marks, especially, early saw the need for chemical research on a broad scale and gave stimulus to fundamental research.

In concluding his talk, Dr. Geer stated that strategy in rubber research was still called for and in the face of present conditions he mentioned two concrete problems which call for early solution. The first of these, he said, was that present-day compounds are much too complex, arising from the fact that the compounder is faced with so many grades of natural rubber, polymers, carbon blacks, and other materials. He suggested that compounders standardize and reduce the number of raw materials. The second problem is the need for a truck and passenger tire that will easily sustain the heavy loads and high speeds of present and future service. He foresaw the need for an elastomer whose hysteresis and other properties must be superior to those of the Hevea grade of rubber.

Dr. William C. Geer (center) is shown receiving the Goodyear Gold Medal from John H. Fielding, chairman of the Rubber Division, ACS. Dr. Harlan L. Trumbull (right) witnessed the ceremony.

Committee on Local Arrangements

All of the activities at the 59th Meeting of the Rubber Division went off smoothly, due to the local arrangements committee which was headed by D. E. Jones (American Hard Rubber) as general chairman. Those in charge of specific activities included the following: *Banquet*, G. N. Vacca (Bell Telephone Labs.); *Hotel Arrangements*, T. A. Bulifant; *Meeting Rooms*, J. Breckley (Titanium Pigment). The thanks of the division are due to this group.

General A.C.S. Activities

As would be expected, numerous special events marked the Diamond Jubilee Meeting of the parent American Chemical Society. These included the dedication of a special bronze plaque hung on the outside wall of the main building of New York University marking the first meeting of the society, held on April 6, 1876, and the general meeting of the society held in the 71st Regiment Armory on September 5 during which numerous foreign and domestic societies presented scrolls to the president of the society in honor of its 75th anniversary. Dr. James B. Conant, president of Harvard University, delivered the main address at the general meeting.

Special ceremonies also marked the society's Jubilee Banquet, held at the Waldorf-Astoria on the evening of September 5. Vice-President Alben Barkley was the principal speaker at the banquet. Other highlites included a special exhibit which graphically outlined in color the activities of the A.C.S., an art exhibit restricted to original works of creative art by chemists and chemical engineers, a display of rare books, numerous plant visits, and a special program at the Hayden Planetarium arranged by the American Cyanamid Co.

The week of September 2 to 8 was set aside as National Chemistry Week and appropriate displays were arranged in retail and other outlets by local sections of the A.C.S. Considerable radio and television time was also secured, with many companies lending their regular time to stressing the continuing importance of chemistry.

Automatic Metallizing Equipment

Designed and built for specific production applications by Metallisation, Ltd. of Dudley, England, fully automatic metallizing equipment is now available in this country through the Dix Engineering Co., Inc., 1415-17 Dix Road, Lincoln Park, (Detroit) 25, Mich. Now that metal spraying has been developed to the stage of being fully automatic for production purposes at economical costs, the field for metallizing by manufacturers is virtually unlimited, the manufacturers state. All ferrous and non-ferrous metals produced in wire form can be applied by metallizing to a wide variety of products including all metals, glass, wood, paper, ceramics, and many plastic base materials.

Under the appropriate title, "Information at Work," the Taylor Instrument Companies of Rochester, N. Y., has released a narrated 30-minute, 16mm, colored moving picture depicting the growth and significance of instrumentation.

RUBBER-STICHTING SETS PROGRAM FOR ABRASION-WEAR SYMPOSIUM

Rubber-Stichting has announced the program for the International Symposium on Abrasion and Wear to be held on November 14 and 15 in its new building in Delft, Holland. Dr. Ir. A. Houwink, director general of the organization will open the symposium on November 14. Dr. H. C. J. de Decker, director of research for Rubber-Stichting, will then make the introductory remarks. Papers to be presented during the symposium and their authors, follow:

"The Friction of Solid Surfaces" by Dr. F. P. Bowden, reader in physical chemistry, Cambridge University, England.

"Principles of Wear Prevention", by Ir. H. Blok, research chemist, Royal Dutch Shell Laboratory, Thornton (Cheshire), England.

"Chemistry of Wear", by Professor Ir. J. J. Broeze, director of research, Royal Dutch Shell Laboratory, Delft, Holland.

"Morphological Aspects of Abrasion and Wear", by Dr. Ing. G. Salomon, Delft, Holland.

"Abrasion and Wear of Rubber", by J. M. Buist, research physicist, Rubber Service Laboratory, I.C.I., Manchester, England.

"Studies in the Abrasion of Rubber", by Dr. A. Schallamach, research physicist, B.R.P.R.A., Welwyn Garden City (Herts.), England.

"The Abrasion Resistance of Paints", by Dr. R. D. Stiehler, chief, Testing and Specifications Section, National Bureau of Standards, Washington, D. C.

"General Survey of the Symposium", by Dr. de Decker.

Dr. Houwink will deliver a closing address at the conclusion of the symposium. Luncheon meetings will be held on both days of the symposium, at which time there will be demonstrations of apparatus for the measurement of abrasion and wear.

Field trips have also been arranged for the two days following the symposium, November 16 and 17. These will consist of visits to industrial and government laboratories. Preprints of summaries of papers to be delivered at the symposium will be delivered at an early date to all participants. Persons wishing to attend the symposium may secure application forms from the secretary, Dr. H. C. J. de Decker, Rubber-Stichting, Postbox 69, Delft, Holland.

Discovers New Sulfur Deposit

Discovery of a large new deposit of sulfur which is expected to be a major factor in solving the current world shortage of this essential mineral was recently announced by the Freeport Sulphur Co. To develop the deposit, located at the mouth of the Mississippi River, the company will build a ten to fifteen million dollar mining plant having a production goal of 500,000 long tons of sulfur a year. The mine, said to be the largest single sulfur development anywhere in the world in nearly twenty years, is expected to be ready for operation in 1953, company officials estimated.

Coming Events

Sept. 20. Southern Ohio Rubber Group, Engineer's Club, Dayton, Ohio.

Sept. 28. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Oct. 5. Detroit Rubber & Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 8-12. National Safety Council, 39th National Safety Congress and Exposition, Chicago, Ill.

Oct. 19. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Oct. 19. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 23. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 23. Washington Rubber Group, Annual Banquet, Cosmos Club, Washington, D. C.

Oct. 26. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Nov. 2. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Nov. 9. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Nov. 14-15. Rubber-Stichting, International Symposium on Abrasion and Wear, Delft, Holland.

Nov. 25-30. A.S.M.E., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Nov. 26-Dec. 1. 23rd Exposition of the Chemical Industries, Grand Central Palace, New York, N. Y.

Dec. 14. Boston Rubber Group, Xmas Party, Somerset Hotel, Boston, Mass.

Dec. 14. Chicago Rubber Group, Xmas Party, Morrison Hotel, Chicago, Ill.

Dec. 14. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.

Dec. 14. New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 18. Buffalo Rubber Group, Xmas Party.

Mar. 3-7, 1952. A.S.T.M., Spring Meeting and Committee Week, Hotel Statler, Cleveland, Ohio.

Apr. 30-May 1-2, 1952. Rubber Division, A.C.S., Spring Meeting, Netherlands Plaza Hotel, Cincinnati, Ohio.

Oct. 29-31, 1952. Division of Rubber Chemistry, A.C.S., Fall Meeting, Hotel Statler, Buffalo, N. Y.

AKRON POLYMER LECTURE GROUP PLANS 1951-52 LECTURE SERIES

The Akron Polymer Lecture Group has planned an interesting series of eight lectures for its 1951-52 season. Now in its fifth season, the group will hear as the opening speaker Dr. G. F. Bloomfield (BRPRA). His subject will be "Chemical Resistivity of Hevea Rubber." Dates of other meetings, speakers and their subjects follow:

October 12—Professor B. A. Mrowca (University of Notre Dame), "Nuclear Resonance Absorption in High Polymers."

November 2—Dr. S. L. Madorsky (NBS), "Degradation of High Polymers."

December 7—Dr. F. R. Mayo (General Electric), "Mechanisms of Addition Polymerization."

January 11, 1952—G. H. Fremon (Carbide & Carbon), "The New Vinyl Fibers."

February 8, 1952—Professor S. H. Maron (Case Institute), "Latex Particle Size and Its Distribution."

March 7, 1952—Dr. Ira Williams (J. M. Huber), "Carbon Black Reinforcement of Elastomers."

April 11, 1952—Professor G. S. Whitby (Akron University), "Some Aspects of Cross-linking in Addition Polymerization."

All lectures will be held at the University of Akron, Akron, Ohio, and will commence at 8:00 P.M. on the date specified. E. S. Pfau (General Tire) is chairman of the lecture group. J. W. Liska (Firestone) is vice-chairman, while V. L. Folt (Goodrich) is secretary, and P. M. Linstedt (Goodyear) is treasurer. Maurice Morton (Akron University) is program chairman.

Company representatives are R. A. Hayes and E. Carr (Firestone); E. E. Gruber and W. C. Warner (General Tire); D. Druesedow and H. Tucker (Goodrich); J. E. Field and R. M. Pierson (Goodyear); C. B. Becker, J. Sellers and A. Strong (Columbia-Southern), and C. L. Parish of the Government Laboratories, University of Akron.

Membership cards for this series of lectures may be obtained from committee members.

Promotions at Ball Brothers

Ball Brothers Co., Inc., Muncie, Ind., has announced the appointment of six new vice-presidents of the company. Five of the six vice-presidents will serve at Muncie, while the sixth was named vice president of the firm's west coast subsidiary, Ball Brothers Co. of Calif., at El Monte. The new vice-presidents are: George E. Myers, formerly treasurer, now vice-president and treasurer; G. Fred Rieman, formerly director of sales, now vice-president in charge of sales; Hugh Crawford, formerly general manager on the west coast, now vice-president and general manager; Robert W. Biggs, formerly manager of glass manufacturing; Fred A. Schlosstien, formerly controller, now vice-president and controller; and Ralph C. Elgar, formerly associated with the Allegheny Ludlum Steel Corp., now vice-president in charge of industrial, personnel and public relations.

CHICAGO RUBBER GROUP OUTING FEATURES GALA GOLF TOURNEY

The Chicago Rubber Group held its Annual Summer Outing on August 3 at the Medina Country Club in Chicago, Ill. Feature of the day was a gala golf tournament in which 175 golfers participated. Other members and guests participated in various games of chance, and some took advantage of the beautiful swimming facilities. An excellent dinner was served in the evening, after which door prizes were distributed. James T. Adams (Sears-Roebuck) acted as chairman for the outing. He was assisted by John Groot (Dryden Rubber), Bob Hartman (Monsanto Chemical), James Knight (Roth Rubber), Al Laurence (Phillips Chemical), Ed Meyers (Herron & Meyer), Dwight Smith (George B. Cary), and Alvin E. Daley (Columbia-Southern).

In the golf tournament, Francis S. Frost (Frost Rubber) won the Charles Baldwin Trophy with a score of 76. Other prize winning low scores were: John Rand (Inland Steel Container), 83; James T. Adams (Sears-Roebuck), 84; Donald L. Zimmerman (U. S. Rubber), 85; and A. Sheehan (Wyandotte Chemicals), 85.

Prizes were also awarded as follows: *Low Putts*, Bruce W. Hubbard (Ideal Roller), G. R. Spangenberg (Rainfair), James A. Knight (Roth Rubber), C. H. Skuza (Central Rubber), A. R. Loosli (American Cyanamid); *Kickers' Handicap*, William A. Schmid (Lavelle Rubber), H. E. Nylen (Lavelle Rubber), A. Sheehan (Wyandotte Chemicals), C. Spencer (Phoenix Mfg.), V. H. Vodra (Wyandotte Chemicals); *High Gross*, E. Jensen (Roth Rubber), B. Kaufman (Lion Rubber), Dick Blair (Columbia-Southern), M. Marsico (Roth Rubber), M. B. Pretorius (Illinois Industrial Rubber).

Peoria Handicap, G. G. Grupe (Lavelle Rubber), W. H. Ayscue (DuPont), Joe Hanisko (Williams-Bowman Rubber), H. M. Hood (Hood Sponge Rubber), A. J. Hawkins (DuPont); *Nearest to Pin No 9*, Herman Boxser (Acadia Synthetic Products); *Longest Drive*, John Rand (Inland Steel Container).

New York Holds Golf Outing

The New York Rubber Group held its annual golf outing on August 7 at the Baltusrol Golf Club, Springfield, N. J. A total of 174 members were registered for golf while 195 members and their guests were present for the dinner which followed the tournament. The following were winners of the different events: *Low Gross*, F. F. Salamon, E. B. Curtis, J. Breckley, F. M. Toland, G. R. Smith, R. E. Clayton, Jr.; *Putting Contest*, O. E. Anderson, L. F. Gilbert, A. C. McFadden, A. R. Loosli; *Kickers Handicap*, J. C. Vincent, E. R. Hansen, J. E. Pittinger, S. H. Tinsley, P. W. Reed, G. Blasius, E. D. Caulkins, W. J. Sparks, D. S. Dilts, E. H. McGhee, H. Andrews, L. Galasso, W. S. Woodward, A. H. Woodward, W. R. Cisney, J. F. Connelly, V. S. Grundy, Dan Rice, R. R. Sloane, O. Isenburg, H. R. Bodell; *High Score*, S. R. Doner. Dan Rice won a raffle for a set of matched irons.

Hoover Joins Pequanoc Rubber

Clyde F. Hoover

Clyde F. Hoover, formerly development manager for the Essex Rubber Co., Trenton, N. J., has been named assistant director of research for the Pequanoc Rubber Co., Butler, N. J. Mr. Hoover is a graduate of Brown University and has had many years of experience in the rubber industry, both in the manufacture of rubber goods and reclaimed rubber. He is a member of the Rubber Division of the American Chemical Society, a member of the New York Rubber Group, and a director of the Trenton Section of the American Chemical Society. In addition, he is also a member of the Sole and Heel Technical Committee of the National Production Authority and a member of the Sole and Heel Technical Committee of the Rubber Manufacturers Association and of the Rubber Heel and Sole Institute.

Southern Ohio to Hear Stempel

The September 20 meeting of the Southern Ohio Rubber Group to be held at the Engineer's Club of Dayton, Dayton, Ohio, will feature an address by Dr. G. H. Stempel, assistant director of research, General Tire & Rubber Co. Dr. Stempel will speak on "Practical Utilization of High Mooney Viscosity GR-S". In another feature of the meeting, William Brown, chief of the Rotating Engine Branch of the Power Plant Laboratories, Wright Aeronautical Development Center, will discuss and illustrate the latest designs and applications of jet-type aircraft power plants.

Chicago Group to Hear Lockwood

The first fall meeting of the Chicago Rubber Group, to be held on September 28 at the Morrison Hotel in Chicago, Ill., will be addressed by Warren S. Lockwood, director of the Natural Rubber Bureau, Washington, D. C. The group will also be addressed by John Strohm, associate editor of "Country Gentleman," and noted author and correspondent. Mr. Lockwood will give his first talk since returning from a trip to Malaya. Mr. Strohm will show a film entitled "Inside Russia," a movie he took himself during his travels.

PLASTIC COATINGS ASSOCIATION REPORTS ON COATED FABRIC USE

The increased use of plastic-coated fabrics and plastic film has been reflected in the first attempt to keep yardage records by the Plastic Coatings and Film Association. Officers of the association noted that the U. S. Bureau of the Census had given figures only for pyroxylin-coated fabrics, and that these had been discontinued after 1948. Since the first of 1951 the association has been assembling figures on all plastic-coated fabrics in the work of its own members and those of the Coated Materials Division of the Rubber Manufacturers Association.

For the first six months of 1951, the figures show 20,808,439 linear yards of plastic-coated fabrics shipped, compared with 16,460,400 yards in the first half of 1950, and 22,109,452 linear yards of pyroxylin-coated fabrics, against 18,709,475 in the first six months of 1950. The figure for all plastic film over ten mils thick totaled 26,499,427 square yards, against 16,033,067 in the first half of 1950. The heaviest proportion of yardage in coated fabrics, 17,393,486 yards, was in heavyweights, over ten ounces.

Films between 10 and 15 mils thickness accounted for most of the square yardage in that field, while in the pyroxylin-coated fabrics most of the shipments, 15,000,000 yards, were in light and heavy cotton fabrics, largely for rainwear. The association said it would continue to issue periodic figures along with estimates of materials available and information on new military developments in their use. As current production is going largely to civilian use, the association will supply information on style and use trends notifying its members if and when the military moves into the market.

Malaya Shipments Low in July

According to reports from London, shipments of rubber from Malaya, including re-exports, during July amounted to 85,745 tons, the lowest monthly figure in the past 12 months. The decrease was attributed mainly to a falling off in native small holders' production in Indonesia, which constitutes a large portion of production of Singapore remilling factories. Trade sources in London estimate that native production in Indonesia in the third quarter may fall by about 35% on the average of previous months. Total shipments from Malaya for the first seven months of the current year amounted to 707,429 tons against 561,791 tons in the like period of 1950. Stocks of all grades of rubber in the colony at the end of July were reported at 53,512 tons against 57,781 at the end of June.

Washington October Meeting

The October 23 meeting of the Washington Rubber Group, to be held at the Washington National Airport Terrace Dining Room, Washington, D. C., will feature the installation of officers for the 1951-52 season. The meeting will be addressed by Brig. General William M. Creasy, Chief, Research and Engineering Division, Army Chemical Center, Edgewood, Md.

Establishes Geer Laboratory

Cornell University, Ithaca, N. Y., has announced the establishment of a new laboratory devoted exclusively to rubber and plastics. The unit is named for Dr. William C. Geer, one of the nation's foremost rubber chemists, who gave equipment from his private laboratory, funds for additional apparatus and a valuable library on rubber toward the project. The center, which will be known as the William C. Geer Laboratory of Rubber and Plastics, has been formed in the School of Chemical and Metallurgical Engineering directed by Dr. Fred H. Rhodes. Professor C. C. Winding, a specialist in rubber and plastic chemistry, will be in active charge. Research is expected to concentrate largely on problems of synthetic rubbers. Similar work has been under way in the school since World War II. The equipment given by Dr. Geer forms a complete unit for producing, vulcanizing and testing rubbers. Dr. Geer, former director of research for the B. F. Goodrich Co., is best known for the invention of the airplane de-icer, one of the chief contributions to safety in aviation. He was also responsible for developing vulcanized covers for golf balls, the Vulcalock process of bonding rubber to metal, the Geer oven for the accelerated aging of rubber samples, and a method of "pelleting" carbon black for use in rubber compounds. A native of Ogdensburg, N. Y., Dr. Geer is a graduate of Potsdam (N.Y.) State Normal School and Cornell. He joined Goodrich in 1907, and in 1918 became vice-president in charge of research and development. He was a director of the company from 1916 to 1928, although he withdrew from executive activities in 1925 to devote his time to private research at his laboratory in Ithaca.

Expanding Lithopone Production

Glidden Co. has announced plans for a 20 to 30% expansion of its lithopone operations in Collinsville, Ill. Lithopone facilities, now in process of being moved from Baltimore, Md., to Glidden's chemical and pigment plant at Collinsville will be supplemented. Production will be increased by 200 to 300 tons when this expansion is completed. The move is part of the company's extensive chemical and pigment expansion program which has been underway for more than a year. Due to difficulty in procuring necessary equipment and mechanical labor, however, the completion date for the program is indefinite.

American Biltrite Nuron Sole

The Heel and Sole Division of the American Biltrite Rubber Co., Chelsea, Mass., has introduced a new shoe sole, the "Nuron." The company states that Nuron soles are far lighter in weight, size for size and thickness for thickness, yet have such toughness and firmness that they more than double the wear of conventional soling materials. Nuron soles will be introduced to the trade and the public with the biggest national advertising campaign in the company's history.

NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request to the Sales Division of Rubber Reserve or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

Y No.	*Polymer Description*
X-666 GR-S	Similar to X-665-GR-S.
X-667 GR-S Latex	Butadiene/styrene charge ratio 83/17 polymerized at 41°-50° F., activated with PMHP or equivalent. Emulsified with oleic acid; shortstopped with potassium or sodium dimethyl dithiocarbamate. Solids 60% min.
X-668 GR-S	A mixture of 25 parts Dutrex 20, 62.5 parts Philblack O and 100 parts of the base polymer described in X-663-GR-S.
X-669 GR-S	Same as X-668-GR-S except that the Mooney viscosity of the base polymer is approximately 80 ML-4.
	Please Note Changes Made in the Following Polymer Descriptions
X-640 GR-S	Charge ratio corrected to read "75/24.5/.5 butadiene/styrene/divinylbenzene."
X-647 GR-S	Changed to read "same as GR-S-101 except shortstopped with potassium or sodium dimethyl dithiocarbamate and sulfur as polysulfide or polyamine."
X-657 GR-S	Same as X-648-GR-S except shortstopped with sodium or potassium dimethyl dithiocarbamate alone or plus polyamine H or equivalent, shortstop Mooney 52 ± 6 ML-4.
X-658 GR-S	Same as X-657-GR-S except polymerized to higher conversion.
X-659 GR-S	Same as X-598-GR-S except emulsified with Armour K-242.
X-660 GR-S	A mixture of 25 parts of Circosol 2XH and 100 parts GR-S-100. Mooney viscosity of the GR-S-100 is 65 ± 5MS-4. Masterbatch is salt-acid coagulated.
X-661 GR-S	A mixture of 50 parts Circosol 2XH and 100 parts GR-S-100. Mooney viscosity of GR-S-100 is 82 ± 5 MS-4. Masterbatch is salt-acid coagulated.
X-662 GR-S	GR-S-100 stabilized with 1.25% Santoflex-B.
X-663 GR-S	A mixture of 25 parts Dutrex 20 and 100 parts of 100 ML-4, 41° F. GR-S. Masterbatch is salt-acid coagulated. Base polymer butadiene/styrene charge ratio 75/25, adjusted to give 20 ± 1% bound styrene polymerized at 41° F.; activated with PMHP or equivalent; emulsified with rosin soap L.M. 219.0.1 or L.M. 219.0.3. Shortstopped with DNCB; stabilized with 1.25% (on the rubber) BLE.
X-664 GR-S Latex	Same as X-523-GR-S Latex except butadiene/styrene charge ratio adjusted to give 20 ± 1% bound styrene.
X-665 GR-S	Butadiene/styrene charge ratio 76/24 adjusted to give 20 ± 1% bound styrene polymerized at 41° F.; activated with PMHP or equivalent; emulsified with rosin soap L.M. 219.0.1 or L.M. 219.0.3; shortstopped with sodium dimethyl dithiocarbamate and sulfur as sodium polysulfide. Stabilized with 1.25% (on the rubber) BLE. Mooney viscosity 60 ± 5 ML-4.

NOTE: The above new polymers are experimental only and the Office of Rubber Reserve, Reconstruction Finance Corporation, does not make any representation or warranties of any kind, express or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

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NEWS IN BRIEF

The Columbia Chemical Division of the Pittsburgh Plate Glass Co., Pittsburgh 19, Penna., has made available a reprint of the article "Compounding of Butyl Rubber with Fine Particle Silica" by Ralph F. Wolf and F. W. Gage, which originally appeared in the February, 1951, issue of *India Rubber World*. Ask for Pigment Data Bulletin 51-2.

Deecy Products Co., Cambridge, Mass., has released a new data sheet covering the stabilizer "Staflex QMXA." The data sheet outlines some of the advantages of the product and recommendations as to its use.

A new one-story building, now nearing completion, will add 50,000 square feet, or an increase of nearly 25%, to the working area in the headquarters of the Foxboro Co. at Foxboro, Mass. The new building will serve as a connection between present factory buildings and a new steel and aluminum warehouse which was recently completed.

Details of a new procedure developed to determine the aging characteristics of electrical insulation are now available in a report from the Office of Technical Services of the U. S. Department of Commerce at Washington 25, D. C. Copies of the report, PB-102619, *Aging Characteristics of Electrical Insulation*, are available from OTS at 50c each.

Harwick Standard Chemical Co., Akron, Ohio, has issued a new folder describing the properties and applications of "Thixon" rubber-to-metal bonding agents. Copies are available on request.

NPA has published a brief, non-technical outline of the principles and operating procedures of the Controlled Materials Plan, which became effective on July 1. The booklet, "ABC's of CMP," may be obtained from NPA or Department of Commerce field offices.

Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio, has made available a new bulletin on motor-generator battery charging equipment. Ask for Bulletin B. 11-210.

The Cleveland, Ohio, plant of the Industrial Rayon Corp., has received a special award from the National Safety Council for its safety accomplishments in 1950.

Syton C-30, a colloidal solution of hydrated silica in water for emulsion type waxes, water-based finishes, textiles, latex and other products, is described in a new bulletin published by the Merrimac Division of the Monsanto Chemical Co., Everett, Mass.

Completely welded polyethylene tank liners of removable and stationary types are now being offered by the American Agile Corp., Cleveland, Ohio.

Dow Corning Corp. has moved its offices in New York City to 600 Fifth Avenue, New York 20. The telephone number is CIrcle 6-7800.

Oilgear Co., Milwaukee 4, Wisc., has released a new four-page bulletin which illustrates and describes three new constant delivery axial piston pumps for pressures up to 3,000 and 5,000 psi. Ask for Bulletin 46901.

Phillips Chemical Co., Akron 8, Ohio, has released a new Philblack Bulletin, Number 20, covering the use of Philblack O in Natural Rubber Treads with Variable Sulfur-Accelerator Ratios.

Pittsburgh Coke & Chemical Co., Pittsburgh, Penna., has announced the receipt of an additional government contract for activated carbon for protection against chemical agents. The contract amounts to $309,000 and brings to $805,000 the total of such contracts held by the Activated Carbon Division of the company.

Publication of a completely new eight-page, two-color brochure on Plastic Rock flooring has been announced by United Laboratories, Inc., Cleveland, Ohio. This new booklet contains information on how and where to apply Plastic Rock flooring as well as certain technical data about the product itself.

Necessary steps to be taken by industry and defense officials for combating sabotage are set forth by civilian and military experts in a new publication of the Chamber of Commerce of the United States, Washington, D. C., entitled "Sabotage and Plant Protection."

Burke Flexo-Products Co., Traverse City, Mich., is producing life-like fishing lures molded from Geon plastic. The lures have been successful in taking all types of fresh water fish.

"Story of Achievement" is the title of a new booklet issued by the General Tire & Rubber Co. which outlines the company's development of a process whereby synthetic rubber production can be increased by mixing the synthetic with special oil additives.

More than 380 leading concerns will occupy all available exhibit space on four floors of the Grand Central Palace in New York City for the 23rd Exposition of Chemical Industries. The dates of the exposition are November 26 to December 1.

Hycar latex is being utilized by the Hawley Products Co. of St. Charles, Ill., in the manufacture of a molded fiber carrying case for projectors and cameras for the Revere Camera Co.

Construction work to house a new large boiler in the main power house of the B. F. Goodrich Co. is now under way. The boiler, built at a cost of $600,000, is said to be the largest ever installed in the Akron area.

Harwick Standard Chemical Co., 901 Broad Street Bank Bldg., Trenton 8, N. J., has made available a new bulletin on Plasticizer HSC #13. Copies are available on request.

Jack L. Danov, Inc., with headquarters at 8620 Wilshire Blvd., Beverly Hills, Calif., has been appointed merchandise representatives for Warner Brothers cartoon characters.

A new sales department for synthetic yarns and synthetic industrial fabrics has been established by the Textile Division of U. S. Rubber. The department will handle the distribution of dynel and rayon knitting yarns, dynel filter fabrics, and other lines.

Valve Engineering & Development Co. of Tulsa, Okla., is using Hycar rubber to eliminate damaging pulsations and shock in oil pipe lines caused by pumping action or by the closing of a valve in drilling operations.

"Elastomers and Plastomers" is the title of a new bulletin made available by Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., which describes services offered by the company in the polymer field.

First prize for distinctive advertising art in the Fort Worth, Texas, Advertising Club's Annual Show, has been awarded to Paul LeMay for his original series of western silhouette illustrations for the Sid Richardson Carbon Co. These advertising illustrations have been appearing regularly in RUBBER AGE.

Aldrich Pump Co., Allentown, Penna., has just released Data Sheet 67-A, describing the Aldrich 6-inch Stroke Direct Flow Pump Series, recently added to the over-all company line.

B. F. Goodrich Chemical Co., Cleveland, Ohio, received an award for outstanding industrial advertising from the National Industrial Advertisers Association at their annual meeting at the Waldorf Astoria Hotel in New York City.

A four-page bulletin has been issued by the Centrifix Corp., Cleveland, Ohio, which illustrates and describes functions of nine types of purifiers for entrainment separation in air, steam, vapor, gas applications in power generation, petroleum refining, chemical and food processing fields. Ask for Bulletin G-51.

LATEST REPORT OF SUBCOMMITTEE XII OF ASTM COMMITTEE D-11

The fifth meeting of Subcommittee XII on Crude Natural Rubber was held at 2:00 P.M. on Wednesday, June 20, 1951, at Hotel Chalfonte, Atlantic City, N. J., with 42 members and guests in attendance. The subcommittee was fortunate to have as its guest Dr. R. G. Newton of the British Rubber Producers' Research Association, who has recently been appointed coordinating officer for technically classified rubber by the International Rubber Research Board. Dr. Newton outlined the advances which had been made in connection with T.C. (technically classified) rubber since the October 1950, Akron, Ohio, meeting of Subcommittee XII.

It was explained that steps had been taken to provide much larger quantities of T.C. rubber and that 20,000 tons in the #1 ribbed smoked sheet grade would be produced in Malaya and Indo-China during 1951, about 10,000 tons from each territory. It is expected that some 3,000 to 4,000 tons of this rubber would find its way to the United States, and the General Services Administration has agreed that the T.C. rubber should be routed to interested consumers and not absorbed into the stockpile. Other grades of the Rubber Manufacturers Association will also be classified as soon as possible.

Dr. Newton drew attention to the fact that the validity of the technical classification on the basis of modulus tests had been confirmed by several consumers in the United States, although Mooney classification was confused by storage-hardening, which had been found to be associated with drying out of the rubber. The work of the Firestone Tire and Rubber Company was acknowledged, which suggested that some of the effects of storage-hardening, as seen in a laboratory test, could be offset by light premastication.

Invites Consumer Comment

It was also mentioned that recent work in Paris, France, had correlated the power consumption in a No. 11 Banbury with the Mooney classification, and Dr. Newton invited consumers' comment on the implications which these two sets of results might have on future progress in the scheme for classifying natural rubber on the basis of its processibility.

From the point of view of standardization of testing procedures, rubber producers' technologists met recently in Paris and agreed to bring their methods more in line with the ISO recommendations by adopting a vulcanization temperature of 140°C. Attention was drawn to work in Malaya with high Mooney rubbers, where differences were found to exist in results obtained with different rotors, although these rotors otherwise conformed to the standard.

A worldwide round-robin test on interlaboratory variation in Mooney testing is being organized from England, and the chairman of Subcommittee XII was invited to nominate three laboratories in the United States to participate. Difficulties have been found in standardizing mixing procedures, and an attempt is being made to get all laboratories to mix to a standard compound Mooney viscosity. Consumers' opinions were invited on this novel approach.

The various changes which have been made in modulus testing were explained, as were the reasons for adopting a low elongation modulus test (100%), and a table of correlation factors was given so these could be interrelated. A special survey for the variation in rate of cure of natural rubber is to be undertaken, and it is possible that the information gained may enable improved methods of technical classification to be introduced after adequate discussion and consultation with the consumers.

Dr. E. M. McColm, Plantations Division, U. S. Rubber Co., who recently returned from a several months' trip to the Far East and who has been particularly active in the technically classified rubber project, complimented Dr. Newton on the work of the BRPRA to date. He emphasized that if U. S. consumers really want to obtain T.C. rubber they should ask their purchasing agents to demand it.

Far Eastern Situation

Dr. McColm reported that the political situation in the Far East varied with the progress of the Korean War. He said that there was much confidence in Malaya at the present time and that the Communist threat in that country had been contained. In Indonesia the most unrest was in Java, not in Sumatra.

It was pointed out that the alternate method of tapping as practiced in Sumatra was likely to cause more variation in plasticity of the crude rubber than the continuous tapping method in general use in Malaya.

C. O. Miserentino, Dunlop Tire and Rubber Co., presented a report of recent work of the section assigned to develop a method for the determination of dirt in rubber. The conclusions were as follows: (1) if more reproducible results can be obtained on samples containing low amounts of dirt, the solution method has a number of inherent advantages over the hot-oil method; (2) to check further the reproducibility of this solution method, the task group would like to have several more members from Subcommittee XII agree to participate in further testing, which will include further refinements in the method believed necessary from data reported; (3) work on the visual method should be continued in order to determine more definitely its possibilities.

Statistical Quality Control

The important problem of the proper method of sampling crude natural rubber previous to testing will be presented to the newly-formed subcommittee XXVIII on statistical quality control.

The chairman mentioned the recent work of van der Bie and others of the Indonesian Rubber Research Institute on dirt and other foreign material in rubber, which is to be published in *Archief voor de Rubbercultuur*. These workers made the point that different types of dirt are found in natural rubber, and the need is to determine what types are most harmful. There is some indication that dirt passing through a 325-mesh sieve is not harmful for most rubber products.

L. V. Cooper, Firestone Tire and Rubber Co., presented a progress report for his section on compounding formulas and test procedures. The results of a round-robin test which included tensile strength, 600% modulus, and elongation at break, indicated that the interlaboratory agreement was very good for measurements on strain testing, only fair on modulus, and quite poor on tensile strength. Analysis of the data by the chairman indicated that this variation in tensile strength was due to variation in ultimate elongation, probably caused by variations of technique in dicing out the dumbbell test specimens.

Mr. Cooper recommended that no change be made in the standard A.C.S.—I Crude Rubber Testing Formula, except that a masterbatch method of adding the pigments and accelerator be used, and that each laboratory establish a deviation percentage for their testing based on the results they obtain on the standard sample of natural rubber as supplied by the National Bureau of Standards, if and when such standard rubber is available.

Dr. R. D. Stiehler, National Bureau of Standards, stated that masterbatches of pigments and accelerators were not generally as stable as the individual ingredients. Changes might be expected to occur within one month, it was added.

Maintenance of Dies

There was considerable discussion of the importance of proper maintenance of dies used for cutting rubber test samples, method of cutting these samples, elimination of other variations in procedure, etc. The need for publication and widespread distribution of the most satisfactory procedures in this connection was emphasized.

R. H. Taylor, U. S. Department of Agriculture Guayule Experiment Station, was asked to serve as chairman of a section to study Mooney viscosity measurements and processibility of crude natural rubber.

There was considerable discussion of possible causes for variation in Mooney results, particularly with high viscosity rubber. Difficulty in properly filling the cup in the Mooney machine, problem of more time to preheat and run the sample, variations in the diameter of the rotor, etc., were included in this discussion. The chairman reported, however, that tests performed at the National Bureau of Standards did not agree with those of some other laboratories, as reported previously by Dr. Newton, that large variations in Mooney values were found between different rotors when used with high viscosity rubbers.

Dr. McColm suggested that a member of Subcommittee XII be appointed as liaison officer to correlate results on technically classified rubber received and tested in this country. It was agreed that these reports should be cleared through the Chairman.

New Appointments at U. S. Rubber

Howard N. Hawkes

H. E. Humphreys, Jr., president of the United States Rubber Company, has been elected chairman of the board of directors, effective September 1. He will continue as president. Mr. Humphreys succeeds Herbert E. Smith, chairman and former president, who retired on August 31, after 38 years of service. Mr. Smith will continue as a director and member of the finance committee. The board also elected John W. McGovern, vice-president and general manager of the tire division, a member of the executive committee. Howard N. Hawkes, assistant general manager of the tire division, was elected a vice-president and appointed by Mr. Humphreys as general manager of the tire division to succeed Mr. McGovern. Both Mr. McGovern and Mr. Hawkes assumed their new duties on September 1.

Mr. Humphreys joined U. S. Rubber as a vice-president, director and member of the finance and of the executive committees in 1938. On January 1, 1942, he was given the additional responsibility of heading the finance committee of the company. Later in the same year he was elected vice-chairman of the executive committee. He became president and chairman of the executive committee on January 1, 1949. Mr. McGovern started with the company as an accountant in 1920. A steady series of promotions led to his appointment as general manager of the munitions division in 1941, and general manager of the tire division in 1943. He was elected a vice-president in 1945 and a director on April 17, 1951. Mr. Hawkes joined the company as a tire adjuster in New York in 1912. He worked his way up through the tire sales organization to general sales manager of the tire division in 1933, and assistant general manager of the company's tire division in 1943.

Aerated Container Corp., Chicago, Ill., has used, with considerable success, an oil resistant Hycar rubber sealing component in valves on compressed air containers of the "aerosol" type for the dispensing of shaving cream, shampoos, whipped cream and other products of a similar nature.

Battelle International Details

Battelle International, the new international research institute to be established in Europe this fall, will maintain laboratories and offices in several Western European countries. It will, in addition, place research investigations in existing research institutes of Europe and in European universities and technical schools. The new institute is being launched by the Battelle Institute, Columbus, Ohio. According to Battelle Director Clyde Williams, a three-man team will return to Europe on September 22 to complete negotiations for laboratory sites and to recruit a European staff. The team also proposes to launch research projects in the laboratories of such organizations as the Fulmer Research Institute (England), TNO Council (Holland), and the Max Planck Gesellschaft (Germany). Battelle International proposes to serve the European economy, on a non-profit basis, through science and technology. As with the parent organization, financial support for the activities of Battelle International will come from industrial sponsorship, both American and European, and from Battelle endowment.

Menuez Joins Ball Brothers

Kyle L. Menuez, formerly vice-president and general manager of the Gro-Cord Rubber Co., Lima, Ohio, has been named general manager of the Rubber Products Division, Ball Brothers Co., Muncie, Ind. He will continue to serve as a member of the Gro-Cord board of directors. A native of Benton, Ohio, Mr. Menuez has been associated in various manufacturing and executive capacities with the rubber industry since 1929. He was with Gro-Cord for the last six years and before that was associated with the Inland Rubber Corp., the Firestone Tire & Rubber Co., and the India Tyre and Rubber Co., Ltd., of Great Britain. Only recently, Mr. Menuez completed a second term as president of the Rubber Heel and Sole Institute and, on two different occasions, was a director of the Elastic Colloid Research Corp., Boston, Mass. A short time ago, he accepted limited assignments of a technical nature with the Government's advisory committees for the rubber industry.

SPI Exposition Slogan Contest

Cash awards of $500, $200 and $100 are being offered for the most effective slogan submitted for the Fifth National Plastics Exposition sponsored by the Society of the Plastics Industry, to be staged March 11-14, 1952, in Convention Hall, Philadelphia, Penna. Any person connected with the plastics industry, its suppliers or its customers is eligible to compete in this contest. Entries must be postmarked not later than November 1. Judges for the Slogan Contest are now being selected and will be announced soon. Entry blanks may be secured from the Slogan Contest Committee, Fifth National Plastics Exposition, 67 West 44th St., New York 18, N. Y.

Fryling Joins Koppers Research

Dr. C. F. Fryling

Dr. C. F. Fryling, outstanding American chemist and a leader in the development of "cold rubber," has joined the Research Department of the Koppers Co., Pittsburgh, Penna. Dr. Fryling will supervise special research projects of a pioneering nature for Koppers. A native of Newark, N. J., Dr. Fryling was graduated from Lafayette College with a B.S. degree, and later obtained master and doctor degrees from New York University. For a time he was National Research Council Fellow at Princeton University. He entered industrial research work with the General Electric Co. and in 1926 joined the Combustion Utilities Corp., where he conducted research on the oxidation of lower paraffin hydrocarbons. From 1931 to 1936, he was senior chemist with the geochemical section of the Illinois State Geological survey where he worked out the fundamental silicate system underlying the production of rock wool. From 1937 to 1944 he was a research chemist for the B. F. Goodrich Co. where he was associated with the group that developed Hycar rubber. From 1944 to 1945, Dr. Fryling was assistant director of copolymer research in the Office of the Rubber Director. Since 1945, he has been supervisor of polymerization research for the Phillips Petroleum Co., where a large part of his work consisted of the development of the "cold rubber" process. Dr. Fryling holds numerous patents, particularly relating to synthetic rubber.

New Booklet on Natural Rubber

A good deal of interesting information is brought to light in the 1951 edition of "Natural Rubber and You," which has just been issued by the Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D. C. Starting with the discovery of rubber by the Indians before 1500, the booklet traces the development of natural rubber to the present. Many commonly held misconceptions are laid to rest by tables showing consumption, prices and sources of natural rubber through the last decade. Copies of the booklet are available without charge from the Bureau.

BRPRA ISSUES SUMMARY OF RESEARCH DIRECTOR'S REPORT FOR 1950

The British Rubber Producers' Research Association, London, England, has released a summary of the report of the director of research for 1950. This latest report on the research activities of the BRPRA states that in the report for 1949, emphasis was laid on the need to preserve a true balance between fundamental and applied research in planning the work of the Association. During 1950, good progress was made in establishing Rubber Technical Developments, the unit operated jointly with the British Rubber Development Board for the purpose of carrying new developments to the verge of commercial exploitation.

The report states that due to difficulties of equipment supplies and staff recruitment, this unit is only now beginning to operate efficiently. It is, however, full of promise for the future, and with the close cooperation of the Applied Research Division of BRPRA, should now begin to reap some tangible reward for the effort which has for years been put into fundamental research. This branch of the Association's activities is continuing unchecked and is believed to contain the basis for a number of future practical developments.

The summary then undertakes to describe the work carried out in 1950 with emphasis on practical applications which are already evident or can be reasonably foreseen. The descriptions follow:

Principal Research Projects

(1) *Vulcanization.* The physical properties and aging behavior of vulcanized rubber depend on its chemical structure. Fundamental researches have suggested methods of controlling the structure, and hence the properties, by varying conditions of vulcanization; these ideas are now being followed up by the applied research group.

A novel method of vulcanization employs an organic peroxide to replace both sulfur and the usual accelerators. The present acute shortage of sulfur and zinc oxide lends added point to this possibility, but a good deal of work is still needed to evaluate the practicability and advantages of the process.

(2) *Aging.* Studies of the chemical reactions responsible for the gradual deterioration of the physical properties of natural rubber have been pushed energetically and with some success. Improved control of aging requires either the development of new methods of vulcanization, as suggested above, or the discovery of better antioxidants than those now used.

Such a wide range of antioxidants is at the disposal of the industry that it seems unlikely that any worthwhile additions can be looked for unless radically new types are discovered. On the other hand, there is reason to believe that a new type of protective agent against the effect of light is soon to become available, and that by its use the resistance of rubber articles to light oxidation will be greatly enhanced.

(3) *Latex.* Research has centered around the general problem of latex stability. Once practical application has been concerned with the development of a new type of heat-sensitizing agent. The object of these agents is to facilitate film deposition on a hot former by making latex unstable at elevated temperatures without seriously reducing its safe storage life at room temperatures. None of the present commercially available materials is ideal, and there appears scope for improvement. In collaboration with a chemical manufacturer, a new group of heat-sensitizing agents, of graded properties, is in course of development and should be on the market in 1951.

Other applications of the work on latex stability relate to the problems of latex foam manufacture and the production, from dispersions, of intimate mixtures of rubber and other materials.

(4) *Rubber-Resin Mixtures.* One type of mixture to which much attention is being given has a "resin" for its second component. Perhaps the most interesting of these is cyclized natural rubber. Efficient methods of producing cyclized rubber in latex form are now known, and a simple method of blending with rubber (as latex) is under test.

The mixture is readily vulcanized, and the products are being evaluated, in collaboration with the British Boot, Shoe and Allied Trades Research Association, as shoe-soling materials. This work is being handled by Rubber Technical Developments.

Other types of resin are also being studied, either simply mixed with rubber or chemically combined with it. Materials of both types vulcanize readily, and the products are in course of evaluation. The hardness of the final products can be varied over a wide range, but special attention is being given to those having a hardness comparable with that of a normal tire tread. As compared with the latter, they have been found to possess some advantages, specially in their behavior under a vibrating load, but much more work is needed to define their sphere of application.

(5) *Abrasion Resistance.* One of the properties of rubber most difficult to investigate is its resistance to abrasive wear. Many types of test machines have been devised, but it is generally agreed that none gives results which correlate closely with, for example, the wear of a tire. The underlying reason for this failure is that neither the factors which determine abrasion, nor the way in which it occurs, have been sufficiently understood.

An investigation of a very much simplified form of abrasion has thrown much light on these problems, and in particular has emphasized the importance of the hardness of the compound used for tire treads. The hardness is of importance only because it limits the movement of the tire on the road, the actual wearing surface being softened by the "working" to which it is subjected. This conclusion has been strikingly confirmed by showing that a plug of unfilled rubber inserted in a tire shows no tendency to wear faster than the surrounding tread. This and certain other aspects of abrasion research are illustrated in a series of photographs which illustrate the summary.

(6) *Tear Resistance.* This is an almost equally difficult problem to investigate, but much progress has been made in studying the growth of a tear, once a cut has been made. It has been found possible to define a quantity which measures the tendency of a rubber to cut-growth. This quantity is characteristic of the rubber, and independent of the particular shape of the cut specimen, or the type and position of the cut. Thus for the first time it becomes possible to relate the results of different tear tests and to assess their efficiency in determining tendency to cut growth.

(7) *Technical Classification of Rubber.* Important progress was made during 1950 towards the experimental introducion of a scheme of testing rubber supplies so that bales can be marked with an indication of the technological properties of their contents. Such work must of course be carried out mainly in the producing countries, but BRPRA—in addition to seconding officers to the Rubber Research Institute of Malaya to work on this project—has also carried out much work on the methods of test.

The first of the two tests applied in classifying rubber, attempts to give some measure of the processability of the sample. The only test of this type hitherto found practicable is a simple viscosity test on the raw rubber. Work carried out in cooperation with the RRI has confirmed that viscosity increases during storage, rapidly at first, tending to a maximum in 12 months or less.

There is evidence that all rubbers behave in much the same way, so that rubbers classified on the basis of viscosity do not change their classification seriously on storage. Work is still in progress to find an alternative test method, since viscosity is admittedly not ideal as a measure of processibility.

The second test in the classification scheme evaluates the vulcanizing characteristics of the rubber. The test used now measures the modulus of a vulcanizate, and is believed generally satisfactory in principle, but much work has been done which may in time lead to its refinement. The meaning of "state of cure" and "rate of cure" have been carefully considered and methods of evaluating them proposed. A method has been worked out for adjusting the results of modulus measurements for processing variation.

Future Program of Work

The present is considered to be a particularly interesting period in the relatively short life of the BRPRA. The study of the science of rubber through fundamental investigations has led to the stage at which the practical problems of the industry can be much more accurately defined, and thus more directly tackled. There are now most encouraging signs of progress in the application of this knowledge in a number of directions. For this reason, no major changes in the program of work are at present contemplated. All the topics reviewed above will continue to receive attention, special emphasis being given to items (1) through (4), the report concludes.

Wiegand Announces Retirement

W. B. Wiegand, vice-president and director of research for the Columbian Carbon Co., New York, N. Y., announced his resignation from the company as of September 1. He will continue with the company, however, as a director and research consultant. Born in Conestogo, Ont., Canada on February 17, 1889, Mr. Wiegand received his B.A. and M.A. degrees from the University of Toronto. From 1913 to 1920 he was associated with the Dominion Rubber Co. as general technical superintendent. From 1920 to 1922 he served as director of manufacturing for the firm of Ames-Holden-McCready in Canada. For the next three years, Mr. Wiegand was managing director for that firm. In 1925, he joined the Binney & Smith Co. as director of research. He remained in that capacity until 1936 when he joined Columbian Carbon as director of research. As a result of his retirement from Columbian Carbon, Mr. Wiegand can devote time to long-planned study and research outside the field of chemistry.

Goodrich Completes Belting Plant

A new $5,000,000 industrial belting plant, said to be the most modern in the world, has been completed and is now in full production at Akron, Ohio, according to the B. F. Goodrich Co. The plant will enable the company to meet the demand for ever larger conveyor belts. Among the features of the new plant are a 664,000 pound press for vulcanizing belts, newest equipment for making steel cable conveyor belts, a humidity-controlled section for manufacturing V-belts, a long belt-building table specially designed with the latest tension control devices, and a complete materials handling system for speedy delivery of raw materials to the production department. A new $235,000 rotary press permits continuous production of certain types of transmission belting, sheet packing and floor matting.

Cold Process Bleached Shellac

Acme Shellac Products Co., Newark, N. J., has developed a new cold process for bleaching shellac resulting in a new product called "Cold-Pro." The basic theory of the process revolves around the fact that heat is harmful to the life of a bleached shellac. By maintaining the shellac as cold as possible throughout the bleaching process, the resultant product is greatly improved as to color, toughness, body, cutting time, solubility and stability. The new method is also said to make for better control of wax content, melting point and acid content.

Akron Group to Hear Spencer

Leland Spencer, Director of the Rubber Division of the National Production Authority, will be the principal speaker at the Fall Meeting of the Akron Rubber Group. Mr. Spencer will talk on "Washington Sidelights." The meeting will be held on Friday, October 19, at the Mayflower Hotel in Akron. D. F. Behney, of the Harwick Standard Chemical Co., is chairman of the group.

Mason Joins General Latex

Fred H. Mason

Fred H. Mason, formerly associated with the Toyad Corp., Latrobe, Penna., where he was chief chemist of the foam rubber production facilities, has joined the technical staff of the General Latex & Chemical Corp., Cambridge, Mass. A graduate of the University of Rhode Island, Mr. Mason had also been associated with the Engineering Laboratories of the Firestone Tire & Rubber Co. At Firestone, Mr. Mason carried out pioneering work on high frequency heating and curing of rubber, and particularly, foam rubber.

Kentucky Synthetic Safety Record

The safety program of the Kentucky Synthetic Rubber Corporation, operator for the Reconstruction Finance Corporation of the Government-owned Copolymer plant at Louisville, Kentucky, received high praise in a recent letter to Dr. Henry F. Palmer, General Manager, from Mr. H. I. Joy, Jr., manager of the safety section of the Reconstruction Finance Corporation's Office of Rubber Reserve. Mr. Joy stated in his letter that "a continuation of the program along the lines presently being pursued, should lead to the development of one of the best overall safety programs in the entire Synthetic Rubber Industry." The record at Kentucky Synthetic Rubber Corporation is excellent. There has been only one lost-time accident since the plant reopened on December 11, 1950, with completely inexperienced and untrained personnel, and reactivation and construction work is still being carried on. At present the safety record shows over one-half million man-hours worked without a lost-time accident.

Auburn Rubber Plans Addition

Auburn Rubber Corp., Auburn, Ind., has announced plans for the construction of an addition to its plant at Auburn. The new facilities will be constructed adjacent to the plant's present shipping room and will add 15,300 square feet. The present building consists of about 66,200 square feet of floor space. Current and expected government business necessitates the new construction, company officials stated.

Firestone Pneumatic Farm Tire

Firestone Tire & Rubber Co., Akron, Ohio, has developed a new farm tire that is said to do the work of a hundred skilled hands and in many cases increases seed germination several days. Having a concave profile and being especially designed to replace the steel-rimmed wheels of the farm planting machine, the pneumatic tire molds the newly planted soil firmly against the seed, covers the fertilizer and provides a uniform blanket of pulverized earth with its convex tread mark. Inflated to 10 pounds pressure, the new tire cushions the shock of hard soil clods and not only decreases dust while planting in dry soil but also goes through wet, early spring soils without balling-up, as in the case of ordinary steel wheels, the company says. The tires, in cushioning the shocks created by obstructions in the field, provide an even and uniform planting depth for the seed and prevent damage to the precision machine. Planting machines with steel wheels now in use may be easily converted to the new Firestone pneumatic tires.

Southeastern Rubber Opens Plant

The Southeastern Rubber Co. chartered in September, 1950 at Athens, Ga., formally opened its new plant in Athens recently. The new plant is equipped for the manufacture of camelback. Later, it will produce other products necessary for the recapping of tires. The firm is headed by Charles W. Holloway as president. Ralph Snow is vice-president, treasurer and general manager. Abit Nix is vice-president and secretary. Grady Oaks is plant and production manager for the new company. The new plant has approximately 14,000 square feet of floor space and with facilities now available will employ about 50 persons. With added facilities, already in the planning stage, the company will employ a force of approximately 100.

Ardux 120 Bonding Agent

A new high strength adhesive claimed to provide secure rubber-to-metal bonds has been announced by the Plastics Division of the Ciba Co., Inc., New York, N. Y. Called "Ardux 120," the product was developed by Aero Research Ltd., the firm's British affiliate. The adhesive is said to bond either natural or synthetic rubber to aluminum, magnesium, or any copper-bearing ferrous or non-ferrous metal. In use, the adhesive is brushed onto both the metal and rubber surfaces, which are then pressed together and held under 10 to 20 psi for 15 to 20 minutes at temperatures in the range of 230 to 248° F. "Ardux 120" may also be used for bonding rubber to most plastics materials.

3M Changes Subsidiary Name

Minnesota Mining & Manufacturing Co., St. Paul, Minn., has announced a change in name for its subsidiary operating the government-owned synthetic rubber plant at Torrance, Calif. This subsidiary is now known as the Midland Rubber Corporation.

NAMES IN THE NEWS

DR. A. J. WEITH, associated with the American Cyanamid Co. since 1937, has been appointed product supervisor in the Synthetic Organic Chemicals Department.

W. B. FRANKLIN, associated with the General Tire & Rubber Co. since 1933, has been named manager of the company's Kraft System Research and Training Center in Akron. STEVE KUZY, who joined General Tire last year, has been named assistant manager.

R. W. KOCH, director of purchases for the Firestone Tire & Rubber Co., has been elected president of the Akron Art Institute.

JOHN REESE, formerly midwestern sales manager for the Plastics Division of the Firestone Tire & Rubber Co., has been named product manager for vinyl-embossed leather for the plastics manufacturing operations of the General Tire & Rubber Co. at Jeannette, Penna.

JOHN F. MORIARITY, formerly on the advertising and public relations staff of the B. F. Goodrich Chemical Co., has been appointed sales promotion manager of the Replacement Sales Division of the Cleveland Graphite Bronze Co.

A. J. JOSEPH, previously process engineer for the General Tire & Rubber Co. at Akron, Ohio, has been placed in charge of machinery operation at the new General Tire plant near Tel Aviv, Israel.

WARREN B. BECKLER, formerly works manager of the LaTuque Pulp Mill of the Brown Corp., LaTuque, Que., Canada, has been appointed a vice-president of the corporation.

C. B. VOSE, former president of the New York Cotton Exchange, and DR. A. E. MARSHALL, consulting chemical engineer, have been elected directors of the Thiokol Corp., Trenton, N. J.

L. DUKE GOLDEN, formerly sales educational director for Perfect Circle, Hagerstown, Ind., has been appointed director of sales education on the administrative staff of the Dayton Rubber Co., Dayton, Ohio.

JOSEPH G. SECK, previously sales manager of the Consumer Products Division of the Davidson Rubber Co., Boston, Mass., has been named vice-president in charge of sales of the Martin Rubber Co., Inc. of Long Branch, N. J.

HARRY ARMSTRONG, SR., associated with the Cameron Machine Co. for 22 years and manager of its Service Department, has been appointed assistant secretary of the company in addition to his other duties.

STEPHEN J. GEOGHEGAN, formerly director of the Materials Control Division of the Industrial Tape Corp., New Brunswick, N. J., has been appointed vice-president in charge of materials control for the company.

REID BARRY GRAY, former chief of testing laboratories for the Glenn L. Martin Co., has been awarded the John Price Wetherill Medal by the Franklin Institute for inventing a collapsible and self-sealing gasoline tank for airplanes.

MAX FELLER, previously assistant to the president of the International Latex Corp., Dover, Del., has been elected a vice-president of the corporation.

DR. GODFREY L. CABOT, president of Godfrey L. Cabot, Inc., Boston, Mass., recently presented a check to Tufts University for the establishment of the Godfrey L. Cabot scholarships at the Tufts Engineering School.

R. M. CLIBOURN, formerly chief chemist of the Goodyear Synthetic Rubber Corp. at Houston, Texas, has joined the Office of Rubber Reserve in Washington, D. C.

MILLARD G. GAMBLE, III, formerly assistant manager of Cordura rayon tire yarn sales for E. I. duPont de Nemours & Co. at Wilmington, Del., has been named manager of the section. He succeeds PIERRE S. DUPONT, 3RD, who recently was made assistant director of sales of the company's Rubber Chemicals Division.

OTTO W. NITZ, formerly professor of chemistry at Northern Montana College, has joined the Kentucky Synthetic Rubber Corp., at Louisville, Kentucky, as chief chemist.

BEN HOLM, technician in the central laboratories of the U. S. Rubber Co. at Passaic, N. J., retired from the company on June 28 after 42 years of continuous service.

M. J. RHOAD, previously associated with the research laboratories of the Goodyear Tire & Rubber Co., has been appointed to the sales staff of the Chemical Division of the company.

R. F. TOMLINSON, formerly sales manager of the Conveyor Division of the A. B. Farquhar Co., York, Penna., has been appointed general sales manager for all divisions of the company. W. D. GOAD succeeds Mr. Tomlinson as sales manager of the Conveyor Division.

E. A. FREIBURGER has been named general sales manager of the Coating Division of the Irvington Varnish & Insulator Co., Irvington, N. J.

FREDERICK L. PATTON, vice-president of the Cambridge Rubber Co., Cambridge, Mass., has been elected president of the Boston Control of the Controllers Institute.

CHARLES R. MAYER, previously vice-president of the United States Bobbin and Shuttle Co., Lawrence, Mass., has been named assistant to the president of the Textileather Corp., Toledo, Ohio.

EDWARD J. STRUBE, JR., formerly associated with the Thermoid Co., has joined the research staff of the Bishop Manufacturing Corp. at Cedar Grove, N. J., where he will undertake development work in new dielectric tapes.

ROSS MEKEEL, secretary of the Cameron Machine Co., Brooklyn, N. Y., has been elected a director of the company.

PAUL STAHLBERG, associated with the General Electric Co. since 1948, has been appointed sales development supervisor of G-E rubber phenolic molding compounds produced by the Chemical Division of the company.

LOUIS S. GLEASON, associated with the General Electric Co. since 1916, has been named superintendent of the plastics molding plant operated by the Chemical Department of the company at Decatur, Ill.

DR. DONALD H. LOUGHRIDGE, previously scientific advisor to the Secretary of the Army, has been appointed assistant director of the Atomic Energy Commission Division of Reactor Development.

KENNETH J. WHISLER, formerly field representative of the Films and Flooring Division of the Goodyear Tire & Rubber Co. at Philadelphia, Penna., has been transferred to Dallas, Texas, in a similar capacity.

FRANK H. GRIFFIN, who devised one of the first practical ways to increase the strength of rayon yarn, has retired as a vice-president and technical director of the American Viscose Corp. He will continue as a member of the board of directors.

HAROLD WILLIAMS, associated with the B. F. Goodrich Co. for the past 18 years, has been named special representative in Washington, D. C., for the Industrial and General Products Sales Department of the company.

FRANK B. MOLEN, middlewest technical sales representative for Kralastic molding powders and Vibrin polyester resins manufactured by the Naugatuck Chemical Division of the U. S. Rubber Co., has moved his headquarters from Naugatuck, Conn., to the division's branch office at Akron, Ohio.

W. WARD JACKSON has been appointed general manager of the Industrial Chemicals Division of the Commercial Solvents Corp.

Radioactive Tires Used in Tests

Radioactive materials are being used in special tires by rubber research scientists conducting tests to determine tread wear. This new method, according to Dr. William L. Davidson, director of physical research at the B. F. Goodrich Research Center, has the advantage of giving instantaneous data and enabling the evaluation of such factors as the type of road surface and temperature, speed, tire pressure and transmission of power on tread wear. There are no completely satisfactory laboratory tests for determining tire tread wear, Dr. Davidson said, and the usual method consists of conducting actual road tests by large fleets of automobiles and trucks. These are costly and time consuming since a tire must be run at least 5,000 miles to observe measurable wear, he pointed out.

The company obtained radioactive phosphorus from the government's Oak Ridge Laboratories and immediately mixed it into the compound for the top layer of the tread material for the special tires. Dr. Davidson obtained his wear data by using a portable Geiger counter mounted on a small cart to scan the track made by the radioactive tire. He also took X-ray photographs of the "hot" tire tracks to measure accurately the amount and size of the particles worn off the tire. Some of the exposures ran as long as several days.

In addition, Dr. Davidson mounted a sheet metal air scoop behind the tire and two inches above the road to measure the amount of rubber blown into the air. The scoop tapered into a standard vacuum cleaner hose where a paper filter trapped the minute rubber particles. Their radioactivity later was measured in the Goodrich research laboratory.

Acrylon Lactoprene Rubbers

American Monomer Corp., Leominster, Mass., has begun commercial production of Acrylon BA-12 and EA-5, new Lactoprene acrylic rubbers. As reported in recent issues of RUBBER AGE, the Lactoprene rubbers were pioneered by the Eastern Regional Research Laboratory of the United States Department of Agriculture. Acrylon BA-12 is resistant to low temperatures, while Acrylon EA-5 is resistant to moderately low temperatures. Both types are resistant to heat, hot oils, boiling water, oxygen, ozone, sunlight, and gas permeability.

Able Rubber Co. Established

The Able Rubber Co. has been formed in Norwalk, Ohio, for the manufacture of mechanical rubber goods. The firm will be managed by C. L. Howells, former plant manager of the Harris Products Co., Milan, Ohio. Work on the new factory building will be started at an early date. It will be a modern concrete block structure with a brick front. Provision will be made for future additions to the building when needed. Mr. Howells expressed the hope that production would be under way by December 15.

Regenerating Rubber Respirator

The Quartermaster Corps of the United States Army is continually seeking new equipment and material for use by the Armed Forces. This work involves a

tremendous amount of research and testing. Pictured herewith is a combat soldier wearing a new regenerating respirator which is made of soft rubber. This is one of the items with which the Quartermaster Corps is experimenting in improving combat clothing worn in Arctic regions.

Folder on Paraplex G-60

Useful data on the properties and performance of Paraplex G-60, the polymeric resin developed by Rohm & Haas Co. which both plasticizes and stabilizes vinyl films, are offered in a new four-page folder titled "Heat Stability for Vinyls." The illustrated folder indicates the resin's compatibility with and solubility in a wide range of materials; describes uses of Paraplex resin for up-grading extender type plasticizers; suggests its use in vinyl lacquers, nitrocellulose products and chlorinated rubber formulations; and offers data on the resin's resistance to soap and alkali. Four tables evaluate physical and electrical properties, list typical formulations and report stabilization effects. Copies are available without cost from the Resinous Products Division of Rohm & Haas Co., West Washington Square, Philadelphia 5, Penna.

C. P. Steuber & Co. Formed

Charles P. Steuber has resigned from the Carbide & Carbon Chemicals Co. to establish his own foreign sales organization. C. P. Steuber & Co. will be located at 11 W. 42nd St., New York 17, N. Y., and will specialize in handling foreign sales for American producers of chemical and related products. The new firm will also act as the American purchasing and sales representative for a number of foreign companies. Mr. Steuber was associated with Carbide and Carbon for over nine years, principally with the Foreign Department. He is a graduate chemical engineer from the University of Wisconsin.

Improved Hevea Trees In Peru

A plan for establishing improved Hevea rubber trees on approximately 6,000 acres in Peru has been drawn up by scientists of the U. S. Department of Agriculture and Peruvian Associates. Key to the improvement plan is a technique for producing high-yielding planting material with resistance to the destructive South American leaf blight. Perfected since World War II, the technique uses a double graft in which a clone of high yielding Hevea from the Orient is budded to an adapted rootstock. When the productive clone reaches a height of 6 feet it is topworked with a bud from a disease-resistant strain. This furnishes protection from leaf blight. Some 40,000 of these young trees are being produced annually in the nurseries of the Cooperative Agricultural Experiment Station at Tingo Maria, Peru. At transplanting stage they are moved to demonstration farms of the Corporacion Peruana Del Amazanos, which has charge of all rubber production in that country.

Barrett Building New Laboratory

Barrett Division, Allied Chemical & Dye Corp., has awarded a contract to build a new applications research laboratory in Edgewater, N. J. Total cost of the project is approximately $500,000 and completion is scheduled for the first of next year. The expansion program will accommodate research on such products as phenolic, alkyd and other resins, plastics, plasticizers, tile resins, rubber chemicals, etc., as well as investigation of uses of new products. The new structure, which will house the most modern applications testing equipment, is to be a one-story building with a partial two-story section. A passageway connecting the new installation with the extended existing facilities will serve to unify the two buildings. Local administrative offices and library will continue to be located in the existing buildings.

Seiberling Personnel Changes

Claude Pitts, formerly associated with the Borg-Warner Corp., has been named assistant manager of the Export Division of the Seiberling Rubber Co., Akron, Ohio. In other personnel changes, A. Wade Schwab and Richard G. Cattron were promoted within the sales organization of the company. Mr. Schwab was named manager of mileage sales replacing C. Sterling Parker who joined the company's field sales organization on a special assignment. Mr. Schwab has been with Seiberling since 1926. Mr. Cattron has succeeded Mr. Schwab as manager of the sales and service laboratory. Mr. Cattron formerly served with the staff of the sales and service laboratory. Mr. Pitts is a graduate of the University of Michigan in 1933 where he received his bachelor of arts degree.

Industrial Nucleonics Corp., 1205 Chesapeake Ave., Columbus 12, Ohio, has released a new bulletin describing Model BG-1 of the company's Beta Ray Gauge. Ask for Bulletin BG-1.

FINANCIAL NEWS

B. F. Goodrich Co.

First Half: Estimated net income of $16,176,202, which is equal to $3.79 a share of common stock, compared with an estimated net income of $12,427,793, or $2.92 a share in the first half of the preceding year. Consolidated net sales in the first six months of 1951 rose 39.1% to $322,175,790 from the $231,612,854 volume transacted in the initial six months a year ago. The consolidated statement as of June 30, 1951, indicated total current assets of $224,097,217, and total current liabilities of $41,675,681. As of June 30, 1950, total current assets were $195,030,847, while total current liabilities were $32,407,178.

Intercontinental Rubber Co.

First Half: Net income of $253,649, which is equal to 42c a share, compared with a net loss of $130,053 in the first half of the preceding year. Sales in the first half of 1951 totaled $905,108, against $121,581 in the first half of 1951. The figures include the parent company and its subsidiaries.

Minnesota Mining & Mfg. Co.

First Half: Net income of $7,951,939, which is equal to $1.00 a common share, compared with 8,816,389, or $1.11 a share, in the first six months of the preceding year. Net sales in the six months ended June 30, 1951, totaled $85,850,163, against $65,577,460 reported in the six months ended June 30, 1950.

National Rubber Machinery Co.

First Half: Net income of $238,645, which is equal to $1.55 a share, on shipments of $3,905,000. Comparisons with the first half of the preceding year are not available. The company reports that its present backlog of orders exceeds $15,000,000.

Raybestos-Manhattan, Inc.

First Half: Net profit, after a $600,000 provision for contingencies and year-end adjustments, amounted to $2,558,422, which is equal to $4.07 a share, compared with $1,545,952, or $2.46 a share, in the first half of 1950.

Belden Manufacturing Co.

First Half: Net income of $619,928, which is equal to $1.93 a share, compared with $750,893, or $2.43 a share, for the six months ended June 30, 1950.

Garlock Packing Co.

First Half: Net income of $950,982, which is equal to $2.27 a share, compared with $668,194, or $1.59 a share, in the first half of the preceding year.

Baldwin Rubber Co.

Year Ended June 30: Net profit of $1,224,327, which is equal to $3.11 each on 393,689 capital shares, compared with $1,445,941, or $3.67 each on an equal number of shares, in the preceding fiscal year. The report stated that expenditures for plant property during the year ended June 30, 1951, amounted to $352,875. It also stated that $500,000 has been appropriated from earnings surplus for plant improvements during the coming fiscal year.

United Engineering & Foundry Co.

First Half: Net income of $1,933,944, which is equal to $2.33 per common share after preferred dividends, as compared with $3,422,625, or $4.14 per common share, earned in the first half of the previous year. Net sales in the first six months of 1951 totaled $29,363,816, against $36,489,448 in the first six months of 1950.

Columbian Carbon Co.

First Half: Net profit of $2,823,275, which is equal to $1.75 a share on sales of $25,802,103, compared with $2,930,524, or $1.82 a share on sales of $22,721,520, in the first half of the previous year.

Mansfield Tire & Rubber Co.

First Half: Net profit of $1,588,082, which is equal to $9.77 a share on sales of $33,060,391, compared with $633,937, or $3.87 a share on sales of $17,564,263, in the first six months of 1950.

General Cable Corp.

First Half: Net profit of $2,693,789, which is equal to $1.21 per common share, compared with $727,000, or 18c a share, in the first half of the preceding year.

Anaconda Wire & Cable Co.

First Half: Net income of $3,120,776, which is equal to $3.70 a share, compared with $1,927,049, or $2.28 a share, in the first half of the preceding year.

Lea Fabrics, Inc.

Year Ended May 31: Net income of $672,408, which is equal to $3.20 a share, compared with $375,777, or $1.79 a share, in the previous fiscal year.

The Rubber Specialties Div. of the Dewey & Almy Chemical Co. is manufacturing what is said to be the first rubber sleeve designed specifically for insulating audio transformer coils. The new sleeve, made of neoprene, is formed by the dip process.

NPA Reports on Carbon Black

The total production of carbon black appears adequate except for one or two grades, the Carbon Black Industry Advisory Committee and the National Production Authority agreed last week. The industry reported that some shipments are being delayed because of a shortage of hopper cars in which carbon black is shipped. NPA told the committee it now appears likely that the industry will get the 110 new hopper cars it has requested to meet the car shortage. These cars are expected to be available by the middle of next year. In the meantime, NPA asked the industry to try to work out a method for getting fullest utilization from available cars. It was pointed out, for example, that hopper cars are frequently tied up at consumer plants for weeks.

Regarding the availability of carbon black, it was agreed that the principal supply shortages are in the grades known in the industry as SRF and thermal. The committee recommended that the Office of International Trade be asked to consider changing its present system of approving exports by grades. As for the over-all supply and consumption of carbon black, NPA estimated that the production capacity by the end of the year will be 1,691,000,000 pounds annually and that it will reach 2,215,000,000 pounds in 1952. Consumption, including exports, was estimated at 1,690,000,000 pounds for 1951 and 1,850,000,000 pounds in 1952.

Minnesota Silicone Rubber Formed

Minnesota Silicone Rubber Co. has been formed at Minneapolis, Minn., for the production of Silicone Rubber parts. The firm is an affiliate of the Minnesota Rubber & Gasket Co., also of Minneapolis. According to Minnesota Silicone officials, this is probably the only plant in the country devoted exclusively to molding Silicone Rubber. A special injection molding process developed by company engineers and believed to be the only one of its kind in the industry makes possible the economical molding of Silicone parts to extremely close tolerances with a very low rejection rate. The new plant will employ 85 workers at capacity and will turn out 500,000 molded parts per day. Paul T. Dennison, George E. Carlson and Robert W. Carlson own the plant in partnership. Burke Neff is plant manager.

Chicago Plans November Meeting

A panel discussion on bonding rubber to metal will be held at the November 9 meeting of the Chicago Rubber Group at the Morrison Hotel in Chicago, Ill. Dr. H. A. Winkelmann (Dryden Rubber) will act as moderator at the meeting. The panel will include the following: H. B. Puff (Durez Plastics), Stewart L. Brams (Dayton Chemical Products), Dr. A. Pechukas (General Electric), H. H. Irvin (Marbon), C. G. Cashion (Xylos Rubber). The panel members will exhibit various types of rubber-metal bonds. In addition, a special exhibit has been arranged by the B. F. Goodrich Co.

One of your best salesmen is COLOR

In toys, bathing caps, balloons, druggists' rubber sundries and miscellaneous novelties, the best sellers have the best colors. Calco supplies a wide range of colored and white pigments for rubber that are bright and clean and are stable to acids, alkalis and sulfurous chemicals.

Calco colors are economical and possess sufficient light fastness for a great variety of products which require brilliant, clean colors for maximum decorative value.

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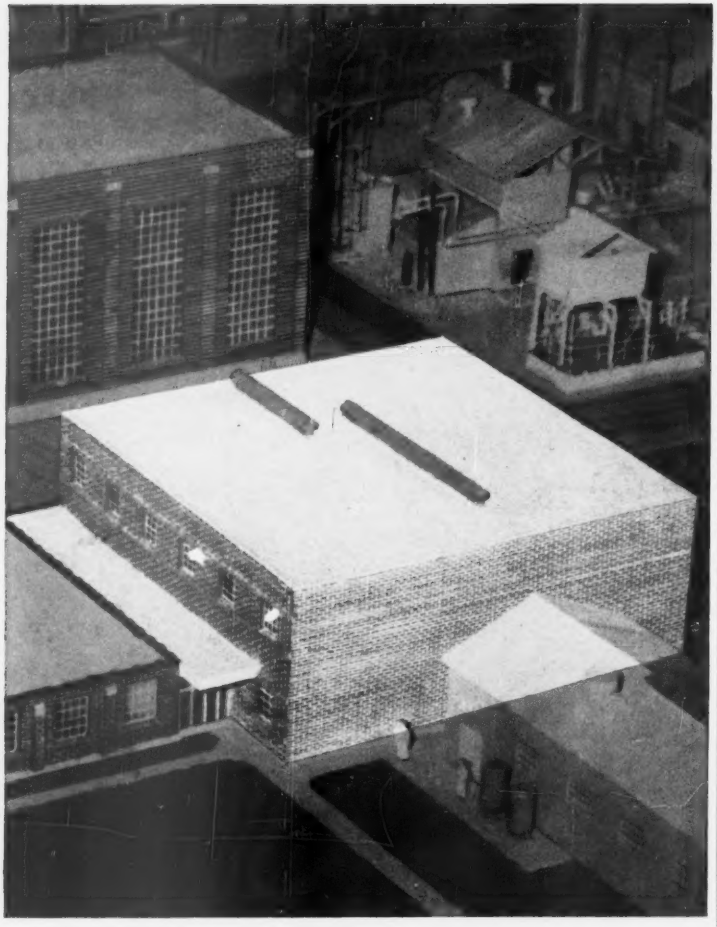


RUBBER CHEMICALS LABORATORY addition at Monsanto's Nitro, West Virginia, plant as it will appear when completed next year.

Monsanto expands rubber research

Monsanto, a leader in rubber chemicals research for three decades, is extending its activities in this field with the construction of a substantial addition to its laboratories in Nitro, West Virginia. The new facilities, which will be in operation in 1952, will more than double space in its rubber research laboratories in Nitro and in Akron, Ohio. The number of scientists and technicians employed in the laboratories will be substantially increased.

Monsanto research has made regular important contributions to rubber progress in the last 30 years, including developments of value in processing of natural, synthetic and reclaimed rubber.

Research facilities of Monsanto are available to the rubber industry. If you have a problem in rubber compounding or rubber research, we hope you will feel free to discuss it with us. For further information, get in touch with MONSANTO CHEMICAL COMPANY, Rubber Service Department, 920 Brown Street, Akron 11, Ohio.

MONSANTO CHEMICALS FOR THE RUBBER INDUSTRY

Antioxidants
Flectol* H
Santoflex* B
Santoflex BX
Santoflex 35
Santoflex AW
Santowhite* Crystals
Santowhite MK
Santowhite L

Aldehyde Amine Accelerators
A-32
A-77*
A-100

Mercapto Accelerators
Santocure*
El-Sixty*
Ureka* C
Ureka Base
Mertax (Purified Thiotax)
Thiotax (2-Mercapto benzothiazole)
Thiofide* (2,2′ dithio-bis benzothiazole)

Guanidine Accelerators
Diphenyl Guanidine (D.P.G.)
Guantal*

Ultra Accelerators for Latex, Etc.
R-2 Crystals
Pip-Pip
Thiurad* (Tetra methyl thiuram disulfide)
Ethyl Thiurad (Tetra ethyl thiuram disulfide)
Mono Thiurad (Tetra methyl thiuram mono sulfide)
Methasan* (Zinc salt of dimethyl dithiocarbamic acid)
Ethasan* (Zinc salt of diethyl dithiocarbamic acid)
Butasan* (Zinc salt of dibutyl dithiocarbamic acid)

Wetting Agents and Detergents
Areskap* 50
Aresklene* 375
Santomerse* S
Santomerse D

Special Materials
Thiocarbanilide ("A-1")
Santovar*-A
Santovar-O
Insoluble Sulfur "60"
Retarder ASA

Colors

Reodorants

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS—PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND

New Chemigum Latices Announced

The introduction of four new synthetic rubber latices, each "tailored" to meet specific requirements, has been announced by the Chemical Division of the Goodyear Tire & Rubber Co. The new Chemigum latices are described as aqueous dispersions of butadiene-acrylonitrile copolymers designed particularly for use in coating, impregnating, and compounding applications requiring unusual adhesion or resistance to oils, greases, alcohols, glycols and most solvents. In the 235 series, Chemigum Latex 235AHS, Chemigum Latex 235C and Chemigum Latex 235CHS have been added to extend possible applications. The 235 series is characterized by a butadiene to acrylonitrile ratio of 55/45. Chemigum Latex 245AHS has been added to the 245 series, characterized by a butadiene to acrylonitrile ratio of 67/33. The alphabetical designations within each series refer to the type of stabilization. In the 235 series, Chemigum Latex 235AHS is a high solids modification of Chemigum Latex 235A and is stabilized with ammonia soap. Chemigum Latex 235C and Chemigum Latex 235CHS contain a synthetic anionic stabilizer to insure stability in processes which tend to increase the hydrogen ion concentration of the latex. Chemigum Latex 235CHS is a high solids modification of Chemigum Latex 235C. Within the 245 series, Chemigum Latex 245A now has a high solids counterpart in Chemigum Latex 245AHS.

Brazil Readies Planting Program

Brazil's ministries of Finance and Agriculture, with the Amazonia Credit Bank, have worked out plans for a new rubber plantation undertaking. The plans call for a capitalization of about 48,000,000 cruzeiros (about $2,600,000), of which half would be supplied by Brazil's rubber goods industry and the rest by the Amazonia Credit Bank and by rubber growers. Plantations would be started at the same time in the states of Para and Amazonas, especially in the area around the Guama River and Fonte Boa on the Purus River. Technical assistance would be supplied by the Northern Farm Institute (Instituto Agronomico do Norte). The program envisages setting out around a million and a half to two million rubber trees. The project would be sort of a "pilot plantation" aimed at getting other rubber growers to follow suit as private planters.

Adopts New Corporate Name

Adoption of the corporate name Read Standard Corp. to replace that of the Standard Stoker Co., Inc., and its wholly-owned subsidiaries, Read Machinery Division and Booth Plant of Read Machinery Division, was recently announced. The new corporation is now operating as a single entity with the same management, personnel, manufacturing facilities, and product lines as the former corporation and its subsidiary divisions. The executive offices of the corporation continue to be located at 370 Lexington Avenue, New York 17, N. Y.

Synthetic Organic Chemicals

U. S. Production and Sales of Rubber Processing Chemicals, 1950

(as compiled by U. S. Tariff Commission)

Chemical	Production *1,000 pounds*	Sales: Quantity *1,000 pounds*	Sales: Value *1,000 dollars*	Sales: Unit value *Per pound*
Grand total	114,509	88,737	44,505	$0.50
Rubber-Processing Chemicals, Cyclic				
Total	98,160	74,781	33,905	.45
Accelerators, total	47,132	31,030	13,328	.43
n-Butyraldehyde-aniline	462	324	194	.60
Dithiocarbamates	193	196	310	1.58
Guanidines	5,478	5,234	2,091	.40
Thiazole derivatives, total	39,816	24,401	9,769	.40
2,2'-Dithiobisbenzothiazole (2,2'-Benzothiazyl disulfide)	14,966	11,471	4,322	.38
2-Mercaptobenzothiazole	14,879	2,888	880	.30
All other	9,971	10,042	4,567	.45
All other	1,183	875	964	1.10
Antioxidants, total	51,028	43,751	20,577	.47
Amino or hydroxy compounds	22,406	20,937	10,627	.51
All other[1]	28,622	22,814	9,950	.44
Rubber-Processing Chemicals, Acyclic				
Total	16,349	13,956	10,600	.76
Accelerators, total	8,316	7,371	6,550	.89
Dithiocarbamates, total[2]	2,224	1,668	1,695	1.02
Diethyldithiocarbamic acid, zinc salt	1,017	600	598	1.00
All other	1,207	1,068	1,097	1.03
Tetramethyl thiuram sulfides[3], total	2,941	2,556	3,004	1.18
Tetramethyl thiuram disulfide	2,244	1,876	2,261	1.21
Tetramethyl thiuram mono and tetrasulfide	697	680	743	1.09
All other	3,151	3,147	1,851	.59
Antioxidants and peptizers, total	8,033	6,585	4,050	.62
Dodecyl mercaptans	6,371	5,751	3,680	.64
All other	1,662	834	370	.44

[1] Includes data for small amounts of tackifiers, peptizers, and inhibitors.

[2] The dithiocarbamates for which statistics are shown in this table are used entirely in the processing of natural and synthetic rubbers.

[3] Includes data for a small amount of tetramethyl thiuram disulfide reported produced for agricultural use.

McNeil Machine to Expand

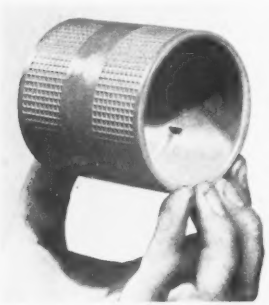
Plans for an expansion project costing an estimated $1,250,000 were recently disclosed by the McNeil Machine & Engineering Co., Akron, Ohio. The program calls for the construction of an addition to the present plant in Akron which will be 67 feet wide and 275 feet long. The extra space will be used as an assembly room for presses made by the firm. Additional machine tools will also be installed in the present assembly department to increase production facilities. It was recently revealed by the Defense Production Administration in Washington that a certificate of necessity had been approved for the firm in the amount of $1,044,972.

Berea Rubber Plant Opens

The new factory of the Berea Rubber Co. at Berea, Ky., was recently opened for the production of O-rings. After final equipment is installed, the plant will employ about 150 persons in a three-shift, 24-hour operation. The plant has over 30,000 square feet of manufacturing space. It has complete facilities for compounding special synthetic rubber formulations, preparation of the raw stock, press molding of the material into precision rings, and finishing, inspection and shipment of the product. All of the plant's output will be shipped to the main Cleveland, Ohio, plant of the company's parent firm, the Parker Appliance Co.

Uscolite Yarn-Carrying Sleeve

Development of a tough new plastic yarn-carrying sleeve for use in textile mills on Barber Colman spooling machines has been announced by the Mechanical Goods Division of the U. S. Rubber Co. The new sleeve is made from Uscolite, a thermoplastic blend of rubber and plas-



tic. The new sleeve is said to have more than five times the impact strength of phenolic varieties now in wide use in the industry. It will not shatter, chip or warp. In addition, it will not nick around the edges, a frequent cause of yarn breakage, wild yarn and knots. It can be used with cotton, rayon or the newer synthetic fibers spun on the cotton system. A waffle design on the surface of the sleeve permits it to carry yarn more securely. It is available in two sizes for the principal types of Barber Colman spoolers and in three colors, blue, grey or brown.

Request End of Dividend Curb

The British rubber plantation industry has asked for exemption from the three-year dividend freeze announced by the British government on July 26. The main grounds of the application, as stated by the Rubber Growers Association, are: (1) Rubber is a key industry in the economy of the sterling area and the dividend freeze would weaken its position against foreign competition; (2) It is uniquely subject to violent fluctuations and over the last decade has suffered unparalleled vicissitudes; (3) The psychological reasons for introducing dividend control cannot logically be applied to the rubber industry. The voluntary dividend limitation in 1948 exempted businesses which had suffered direct war damage and enemy occupation, the application argued. Gross dividends of 105 companies whose yearly accounts end during the first quarter averaged 2.6% over the last ten years. Rubber companies have been restraining and would continue to restrain their dividends, the rubber growers said.

New technical bulletins on Wing-Stay S, a non-discoloring, non-staining antioxidant, have been issued by the Chemical Division, Goodyear Tire & Rubber Co. Techni-Guide WS-100-3 deals with the use of the product in GR-S compounds, and WS-100-4 gives information on the use of the material in shoe sole compounds.

LABOR NOTES

Goodyear Tire & Rubber Co. and the United Rubber Workers, CIO, announced, on August 28, a wage agreement providing 13c an hour pay rises to nearly 26,000 workers in Goodyear plants in 10 cities. Goodyear thus became the last of the "big four" to come to terms with the union. Like the other companies, Goodyear's pay boost is the second since the middle of last October when all manufacturers granted an increase of 12c an hour.

About 1,350 employees of the A. Schrader's Son Division of the Scovill Manufacturing Co., Brooklyn, New York, walked out on August 9 in the first strike in the company's 107-year history. The walk-out forced a shut-down of the plant affecting 1,725 employees. The strike came as a result of a breakdown in negotiations over an August 1 wage reopening in a two-year contract signed in June, 1950. Management offered 6c an hour pay increases while the International Union of Electrical, Radio and Machine Workers, CIO, asked 13c an hour.

Representatives of the URW and the American Hard Rubber Co. have signed a new contract calling for a 12c an hour pay boost and a 3c an hour night differential hike for 571 production employees.

Pay boosts of 13c an hour have been granted 800 production employees of the Mohawk Rubber Co. in an agreement signed with the URW.

In a joint company-union statement, the Sciberling Rubber Co. and the URW announced the signing of an agreement calling for a 13c an hour wage increase. The new contract calls for a full union shop at the company's Barberton and Carey, Ohio, plants.

Personnel Changes at Phillips

Phillips Chemical Co., wholly-owned subsidiary of the Phillips Petroleum Co., has announced five personnel changes. J. W. Barber, formerly superintendent of Philblack Plants at Borger, Texas, has been assigned to the Philblack Sales Division as rubber service engineer. Mr. Barber recently returned from an extended assignment in England, in connection with the start up of operations of the Philblack, Ltd. plant. Succeeding Mr. Barber as superintendent of Philblack plants is A. I. Head, who was acting superintendent during Mr. Barber's absence. Austin Morgan, previously service superintendent of the Plains Plant, has been assigned to the newly-created position of assistant chief mechanical engineer, located at Bartlesville, Okla. H. H. Stoelzle, formerly acting mechanical and maintenance superintendent at the Plains Plant, has been named to succeed Mr. Morgan as service superintendent. M. L. Studebaker, previously consulting chemical engineer in the Process Engineering Division, has been assigned to Philblack Sales Division as technical service engineer, with headquarters in Akron, Ohio.

"Prettyprints" Scatter Mats

Pretty Products, Inc., Coshocton, Ohio, has introduced a new line of bath and scatter mats called "Prettyprints." Unlike other rubber floor coverings, the color is actually enclosed in the rug and will not wear off. Each "Prettyprint" is a gaily-

colored fabric encased in a transparent rubber coating. A wide assortment of colors, designs and special picturesque patterns are available for every room in the house. An outstanding feature of the product is the exclusive, patented "watch-crystal" design. The contour of each "Prettyprint" resembles a shallow vacuum cup. Its outer edges hold fastly to the floor to eliminate curling. Doors will close easily over the product, the company states.

Carbon Black Export Quotas Set

The Office of International Trade has set a third-quarter export quota for furnace black of 32,500,000 pounds. Channel black will continue to be licensed to meet essential requirements of friendly foreign countries without specific quantitative limitations in the third quarter, OIT said. "A slight easing of the supply of some types of furnace black has permitted a 2,500,000 pound increase in the third-quarter export quota as compared with the second quarter," OIT said. Supplies of semi-reinforcing, fast extrusion, and furnace thermal blacks continue tight. To provide special protection for the domestic supply of these grade, OIT will license no more than 6,000,000 pounds of SRF, 4,000,000 pounds of FEF and 4,000,000 pounds of furnace thermal black against the total export quota of 32,500,000 pounds of furnace black in the third quarter.

French Elected Vice-President

Firestone Plastics Co., Pottstown, Penna., has announced the promotion of Elmer French to vice-president in charge of sales. This post was newly created because of the plans for additions to the plant at Pottstown resulting from the rapid expansion of Firestone's plastics activities. Mr. French has been with the Firestone organization for the past 10 years. He served as manager of retail sales for the parent concern, the Firestone Tire & Rubber Co., and later transferred to the plastics company as general sales manager when it was organized in 1947. His previous experience included a partnership in an industrial engineering firm in New York; assistant to the president of the National Department Stores; and assistant to the vice-president and divisional retail manager of Sears, Roebuck & Co.

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Firestone Stock Split Approved

Stockholders of the Firestone Tire & Rubber Co., meeting in Akron on September 8, approved an amendment to the company's articles of incorporation making possible a two-for-one stock split. Less than 1% of outstanding stock was voted against the amendment. Directors of the company subsequently announced that the two-for-one split will be effected through distribution of the new common shares on October 26 to holders of record on October 11. The directors also voted a dividend of $1.50 on the present common, payable on October 20. A similar amount was paid in the previous quarter when the rate was raised from $1 a share. The authorized common shares were increased to 7,000,000 of $12.50 par value from 3,500,000 of $25 par value. Following the stock split, the company will have 3,903,868 shares of common stock outstanding. Shareholders had also approved the release from pre-emptive rights of stockholders of an amount not to exceed 700,000 shares of common to be appropriated for sale to employees. They also ratified the employee incentive stock option plan dated July 2, 1952.

Buys Interest in Ceylon Plant

According to press reports, the General Tire & Rubber Co. will be part owner of a new factory to be established near Colombo, Ceylon. The new firm will be known as the National General Tyre Corp., and will have an estimated annual capacity of 75,000 tires. Behind the project are a Ceylon firm, C. W. Mackie & Co., the Ceylon government and General Tire. A factory will be set up at Moratuwa Town, 12 miles south of Colombo. In addition to tires, batteries and miscellaneous rubber goods also will be produced. The announcement in Colombo said General Tire and the Ceylon government will invest 1,000,000 rupees each in the enterprise, about $210,000 in American money; Mackie will contribute 500,000 rupees and the balance up to 5,000,000 will be raised by public subscription. As of this writing, officials of General Tire have not commented upon the report. The company's new affiliated plant in Israel is now under construction and is scheduled to begin operation early next year.

Brazilian Plastics Firm Planned

Arrangements have been completed between the B. F. Goodrich Chemical Co. and S. A. Industrias Reunidas F. Matarazzo to form a jointly-owned plastics manufacturing company in Brazil. The company, to be known as Geon do Brasil, will have plants near Sao Paulo. In making this announcement, W. S. Richardson, president of Goodrich Chemical, said the new concern would have an initial production capacity of 6,000,000 pounds of Geon polyvinyl materials annually. These plastics are used to make luggage, rainwear, flooring, insulation and a number of other products for industrial and home use. The plants will manufacture vinyl chloride monomer, Geon polyvinyl chloride resins and Geon plastic compounds.

LOS ANGELES NEWS

Construction has begun on a new 53,420 square foot building at 2940 East 44th St. which will be the new Los Angeles headquarters for five sales divisions of the B. F. Goodrich Co. Divisions making the move include Replacement Tire Sales, Industrial Products, Shoe Products, Drug Sundries, and Footwear. Office space will comprise 8,000 square feet with 45,420 square feet for the warehousing of tires, tubes, accessories, industrial products, footwear, auto and home supplies. Another 13,320 square feet outside will be devoted to truck dock and customer parking.

Naugatuck Chemical Division, U. S. Rubber Co., began construction of its new plant at 5901 Anaheim-Telegraph Road at the end of August. The new plant will be located adjacent to the U. S. Rubber tire plant. The new building will have approximately 36,000 square feet of floor space and is scheduled for occupancy by January 1, 1952. Naugatuck Chemical will centralize their operations and sales for Lotols, rubber chemicals, agricultural and aromatic chemicals at the new installation.

Howard C. Lien has announced that Howard Latex, Inc., has discontinued the manufacture of foam rubber products. Equipment for that purpose has been dismantled and sold. Mr. Lien will devote all of his efforts to the H. C. Lien Rubber Co., specializing in the manufacture of chemically blown sponge products.

William J. Haney of the Kirkhill Rubber Co. has been appointed to the OPS Industry Advisory Committee for molded, lathe-cut and extruded rubber goods.

A. F. Reznicek has announced the formation of Rubber Products Engineering at 108 East Fourth St., Los Angeles. The firm will offer consulting services on sales engineering, product application and design, development, specifications and manufacturing. The service will also encompass compounding and processing as well as advise as to type of materials to be used in order to accomplish a specific purpose.

Mr. Reznicek is a graduate of the University of Kansas and has had approximately 15 years experience in rubber technology and engineering. For the past five years he has been technical director for the W. J. Voit Rubber Corp. in Los Angeles. Previously, he was associated with the Firestone Tire & Rubber Co. Mr. Reznicek was also associated with Gates Rubber Co.

Johnson & Johnson, New Brunswick, N. J., has introduced a handy new first aid kit with the kit itself molded of flexible Bakelite polyethylene. The translucent case is attractively styled and can be refilled or used for other purposes.

More Certificates of Necessity

The Defense Production Administration has issued a number of additional Certificates of Necessity providing for accelerated tax amortization on new defense facilities. Certificates issued recently include:

American Hard Rubber Co., Butler, N. J., $763,855 for separators.

Hewitt-Robins Inc., Buffalo, N. Y., $16,298 for wire hose.

Minnesota Mining & Manufacturing Co., St. Paul, Minn., $600,670 for adhesives, coatings and abrasives, and tapes.

Narragansett Wire Co., Pawtucket, R. I., $125,063 for infantry wire.

Parker Appliance Co., Cleveland, Ohio, $201,370 for gaskets.

Pacific Hard Rubber Co., Vernon, Calif., $38,654 for rubber cases.

Kirkhill Rubber Co., Brea, Calif., $15,548 for ducts.

U. S. Rubber Co., Shelbyville, Tenn., $354,654 for cotton duck.

B. F. Goodrich Co., Akron, Ohio, $72,800 for reclaimed rubber.

Parker Appliance Co., Cleveland, Ohio, $201,370 for gaskets.

New Sun Rubber Appointments

Appointment of A. Clark Mack, Jr., and Gene Gamble to key administrative positions with the Sun Rubber Co., Barberton, Ohio, was recently announced. Mr. Mack has been named assistant to the president, and Mr. Gamble has been named director of public relations. Immediately prior to joining Sun Rubber, Mr. Mack was manager of belt sales for the B. F. Goodrich Co. He had been associated with Goodrich for 11 years. During World War II, Mr. Mack served on the Industry Advisory Committee of the War Production Board and formerly was a member of the Industry Advisory Committees of the National Production Authority and the Office of Price Stabilization. He is a graduate of Ohio State University. Mr. Gamble, a graduate of Princeton University, previously served with the Hercules Powder Co. in an editorial capacity. During World War II, he was associated with the U. S. Army's Manhattan Project at Los Alamos, New Mexico.

Dutch Boy CS-137 Stabilizer

A new stabilizer for transparent vinyl plastics has been developed by the Chemical Division of the National Lead Co. Known as Dutch Boy CS-137, the new product is designed for use in vinyl resin film and sheeting wherever exceptional light stability is of importance. Evidence of its excellent resistance to light exposure is shown by the fact that 6,000 hours in a Weather-Ometer found CS-137 substantially unchanged. Dutch Boy CS-137 is a barium sodium organic complex.

"Machine Tools and Their Hazards," is the title of a new bulletin issued by the U. S. Department of Labor, Washington, D. C. Copies of Bulletin 129 may be secured from the Bureau of Labor Standards, Washington 25, D. C.

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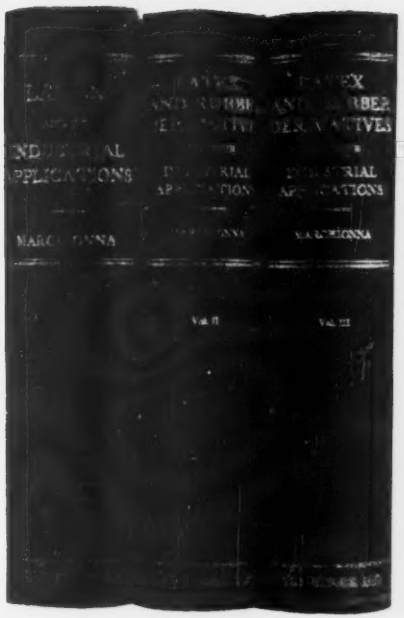

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CANADIAN NEWS

According to Canadian trade sources, further expansion for the General Tire & Rubber Co. of Canada is seen in its recent acquisition of the Joseph Stokes Rubber Co. of Welland, Ont. Stokes is one of the largest Canadian manufacturers of battery boxes and also produces a wide range of mechanical rubber goods, soft and hard rubber products and plastic products.

General Tire will continue the manufacture of all these lines and will add other special mechanical rubber and plastic products. Stokes ownership of an additional 10 acres of land north of its Welland plant is believed to have had an influence in the decision of General Tire to acquire the Stokes business. General Tire is said to have plant expansion plans for this extra land. Employment at the plant will be raised to the 1,000 level by year end from the 800 persons presently employed.

The Stokes plants comprise approximately 160,000 square feet of floor space on 13 acres of land. Stokes Rubber is now known as the Stokes Division of the General Tire & Rubber Co. of Canada. The combined assets of the General Tire & Rubber Co. of Canada are now over $6,000,000 and it is anticipated that annual sales will exceed $15,000,000.

Production at the Goodyear Tire & Rubber Co. plant at New Toronto, Ont. was recently slowed in some departments and stopped in others as 400 tire room employees walked out. The employees complained about the temperature in the plant. Company officials said the men who led the walkout have been suspended and the URW has filed a grievance. The men returned to work after two days following a union-company agreement in which Goodyear promised to give workers civic holiday pay if the men worked the day before and the day after.

Additional information has been secured on the new plant to be built at London, Ontario, by the Canadian Minnesota Mining & Manufacturing Co., Ltd. When completed, the existing equipment of the company's adhesive, coating and sealer departments, now located in temporary space, will be moved into the new plant along with additional equipment. Other products to be made in the new plant include tapes, and the company is securing specially designed equipment for the production of several coated products, including abrasives and reflective sheeting.

In addition to the regular chemical laboratory, and the usual equipment for testing electrical, mechanical and other properties of the company's wide range of materials, the new plant will also contain pilot plant facilities for numerous processes. The building to be erected will be of steel construction with cement block walls and a cement slab roof. The first project planned will comprise 135,000 square feet of factory area, as well as a boiler house and storage tanks for the various solvents. Some manufacturing operations are contemplated before the end of the current year, with full operation scheduled for the spring of 1952.

Gutta Percha & Rubber, Ltd., Toronto, Ont., has opened new offices and warehouses in Montreal, Quebec City, and St. James, Manitoba, to provide additional facilities for the distribution of products produced in Toronto.

The Canadian Bureau of Statistics at Ottowa has stated that Canada's stocks of nautral, synthetic and reclaimed rubber are on the increase while consumption is down. The Bureau reported that over-all stocks at the end of June were 20% greater than at the same date in 1950, and that consumption during the month declined 10%. Stocks of natural rubber rose 24%, and consumption fell 18% during June.

I. J. Needles, newly-elected president of the B. F. Goodrich Rubber Co. of Canada, has been appointed a director of the Rubber Association of Canada succeeding G. W. Sawin who recently resigned as president and general manager of the company.

The Canadian operations of the Wheelco Instruments Co. of Chicago, Ill., will now be handled by their new Canadian subsidiary, Wheelco Instruments of Canada, Ltd. Corporate officers are R. A. Schoenfeld, president, Francis Beaupre, vice-president and secretary, and E. I. Stevenson, vice-president and treasurer. The new company is under the personal direction of Mr. Beaupre with offices at 601 Merton St., Toronto 12.

Southern Alkali Changes Name

Effective September 1, the corporate name of the Southern Alkali Corp. was changed to the Columbia-Southern Chemical Corp. A wholly-owned subsidiary of the Pittsburgh Plate Glass Co., the firm is a producer of soda ash, chlorine, caustic soda and related chemicals. Plants are located at Barberton, Ohio; Corpus Christi, Texas; Natrium, West Va.; Lake Charles, La.; and Bartlett, Calif. Clarence M. Brown, chairman of the board of directors for both the Pittsburgh Plate Glass Co. and the Columbia-Southern Chemical Corp., stated that the action involves a change in name only. He said that personnel, policies and customer relations will not be affected. The activities of the former Columbia Chemical Division of the Pittsburgh Plate Glass Co. have been transferred to the new Columbia-Southern Chemical Corp.

Use of Neoprene in Paper

After spending three years and almost $1,000,000 on research, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has developed a new and economical way to add neoprene to paper. Instead of coating or saturating the finished paper, as in old methods, the neoprene is now added in latex form to the pulp just before it is made into paper. The result is a new family of low-cost specialty papers made directly on the paper machine. Outstanding advantages of the new papers are wet strength, chemical resistance, and all-around improvement in physical properties. These properties will give rise to superior paper products of many kinds, the company said. One now under development is a porch, or summer, rug for indoor or outdoor use. Woven of twisted neoprene paper, these rugs are said to have excellent abrasion and wear resistance; they can be washed with soap and water and hung up to dry without sagging or losing their shape. Disposable diapers are another promising possibility; they are made with soft absorbent paper on the inside, wet-strength neoprene-treated paper on the outside. In the industrial field neoprene-treated paper has undergone successful field trials in such applications as gasket paper, multiwall bag paper, wrapping paper, and industrial filter paper. DuPont announced that it will not itself manufacture any of these papers, its role will be to supply neoprene latex and technical assistance to the paper industry.

Improved De-Icer on Navy Plane

The U. S. Navy's versatile AD-Skyraider sports an improved pneumatic deicing system that is more efficient in breaking ice formations and is capable of withstanding the speed of this attack bomber without lifting from the the wing surfaces. Developed by the B. F. Goodrich Co. in close collaboration with the Bureau of Aeronautics of the Navy, the new design exerts greater strain between ice and rubber to produce faster ice-breaking action. Research men on the problem found that smaller air tubes, greater air pressure, and a faster inflation and deflation cycle proved to be the answer. The expanding tubes were reduced to 1¼-inch size and the air pressure increased from 7 to 15 pounds per square inch. Then, the use of a Solenoid manifold system provided a pressure and a vacuum for more rapid inflation and deflation. These changes in pneumatic de-icing were found to be the most practical in providing adequate ice protection for the AD-Skyraider.

American Resinous Names Agent

American Resinous Chemicals Corp. and the American Polymer Corp., both of Peabody, Mass., and their associated companies, have named Baker & Collinson, Detroit, Mich., as agents in the state of Michigan. During the past 50 years, Baker & Collinson have served industrial plants in Michigan in the rubber, plastic and other fields. The firm maintains office and warehouse facilities in Detroit.

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OBITUARIES

Herman M. Koelliker

Herman M. Koelliker, vice-president in charge of the Sirvene Division of the Chicago Rawhide Manufacturing Co., Chicago, Ill., died suddenly of a heart attack on August 21. He was 59 years old. Born in Cleveland, Ohio, Mr. Koelliker was a graduate of Case Institute of Technology in the class of 1914. Prior to joining Chicago Rawhide, he had been vice-president and general manager of the Ohio Rubber Co., and vice-president and a director of the Baldwin Rubber Co. His earlier experience included work with the Grasselli Chemical Co., U. S. Rubber Co., Buckeye Rubber Co., and the Tucker Rubber Co. Mr. Koelliker joined Chicago Rawhide in 1936 for the purpose of pioneering and developing the uses of molded synthetic rubber products as precision machine parts. Under his management the Sirvene Division of the company grew from a small technical staff in 1936 to a technical and manufacturing division employing more than one thousand persons. He became a vice-president of the company in 1942. Mr. Koelliker was a director of the Case Alumni Association and president of the Chicago Case Club. He was greatly interested in and a contributor to the work of the Y.M.C.A. He was also active in the promotion of the National Association of Foremen. He leaves three brothers and his sister.

Frank Ryan

Frank Ryan, assistant to the vice-president for production at the Manville, N. J., plant of the Johns-Manville Corp., died on July 25 at the Dover General Hospital in Dover, N. J. He was 62 years old. Born in Saugerties, N. Y., Mr. Ryan started with Johns-Manville in 1906 at the Brooklyn, N. Y., factory. He came to the Manville factory in 1913 shortly after construction started. Mr. Ryan worked successively as storekeeper, purchasing agent, office manager, production manager, assistant general manager, industrial relations manager and then became assistant to the vice-president for production, coordinating the activities of all divisions of the company at Manville. Mr. Ryan was chairman of the New Jersey State Democratic Committee. His wife, three sons and four daughters survive.

Ed C. Dill

Ed C. Dill, tool purchasing agent for the Inland Manufacturing Division of the General Motors Corp., Dayton, Ohio, died recently in Dayton. He was 64 years old. Mr. Dill, as contact man for Inland Manufacturing in the Akron, Ohio, area, was well known among officials of mold and machine companies there. Funeral services were held on August 28 in Dayton. He leaves his wife and his son.

George T. Dyas

George T. Dyas, superintendent of the North Bergen, N. J., plant of the U. S. Rubber Co., died on August 25 at the Medical Center in Jersey City, N. J. He was 66 years old. Mr. Dyas was a pioneer in the unloading and handling of natural rubber latex in bulk quantities as it is shipped to this country from the Far East. During World War II, he supervised the storage and handling of more than half the nation's supply of latex at a time when it was one of the highest priority materials. Mr. Dyas joined U. S. Rubber in 1915 at the company's general laboratories which were then located in New York. He was promoted to foreman of unloading operations for the Plantations Division in 1923. In 1924, he became superintendent of the North Bergen plant, a position he held since that time. He was a member of the company's 25-year club. Services were held on August 29 in Jersey City with burial in Holy Cross Cemetery, North Arlington, N. J.

Christopher Harris

Christopher Harris, for the past 40 years engaged in the servicing of Farrel-Birmingham equipment in the field, died suddenly while on a recent service call in Ontario, Canada. He was 66 years old. Mr. Harris had specialized in the highly-skilled work of grinding and polishing calender rolls in rubber and plastics manufacturing plants in all sections of the United States and also in Canada and Mexico. He was first hired by the Farrel-Birmingham Co. in 1899 and before his death was one of a group of nine senior "Old Timers" still actively employed, each with a record of over half a century of service with the company.

Alfred G. York

Alfred G. York, vice-president and a director of the Watson-Stillman Co., Roselle, N. J., died at his home in Elizabeth, N. J., on July 22. He was 57 years old. Mr. York joined the company in 1918 as assistant treasurer, and later, while assistant to the president, developed the Distributor Products Division of the company. He was elected vice-president and sales manager in 1941 and a director in 1945. He was a member of the Society of the Plastics Industry, the American Petroleum Institute, and other technical and fraternal organizations. Two sons and a daughter survive.

Joseph P. Muzzio

Joseph P. Muzzio, founder and president of the Brooklyn Color Works, Brooklyn, New York, died on September 4 at his home in Staten Island, New York. He was 82 years old. Two sons and two daughters survive.

Henry C. Bostwick

Henry Clay Bostwick, development engineer for the Akron Standard Mold Co., Akron, Ohio, died on July 24 in City Hospital in Akron after a heart attack. He was 71 years old. Mr. Bostwick had been associated with Akron Standard for the past 30 years. A pioneer in the development of rubber machinery, Mr. Bostwick was widely known in the rubber industry. Services were held on July 24 at the Billow Chapel in Akron, with interment in Mt. Peace Cemetery. His wife and son survive.

William G. Parsons

William Guy Parsons, who retired twenty-five years ago as a vice-president of the U. S. Rubber Co., died on July 23 in Browne Memorial Hospital in Poughkeepsie, N. Y. He was born in Queenimo, Kansas. Mr. Parsons is survived by his son.

Sponge-Filled Airplane Propeller

An airplane propeller filled with sponge rubber is now in manufacture at the Hamilton Standard Division of United Aircraft Corporation. Light as a feather, bone hard, and strong, the hard sponge is used to fill the void between propeller blade core and shell, keeping the latter from vibrating in and out under extreme pressures, and supporting it against the impact of rocks, ice, and other material thrown up by the plane's undercarriage. The new filling compound, called HS 160, has three principal components; Hycar OR-15, phenolic resin, and nylon. The blowing agent used to foam this rubber-resin blend up to eight times its former mass is the highly reactive chemical, azodiisobutyronitrile. After foaming under 300° F. temperatures, the compound cools into a light, rigid structure which fills every portion of the aperture between propeller core and blade edges, and the hollow core itself. HS 160 has been so compounded that high centrifugal loads will not cause it to shift after its installation.

Carbo-Flex 6040 Patching

Carboline Co., St. Louis, Mo., has introduced Carbo-Flex 6040, a new patching material for rubber coatings and linings. The patches are said to be flexible, hard, resistant to cracking and completely adherent to rubber and wood. The company also states that the material is more corrosion resistant than either rubber or wood and has low shrinkage. Carbo-Flex 6040 is applied to metal with a trowel, after the surface has been coated with a primer and allowed to dry. For application to wood, surfaces need be cleaned and dry, but a primer need not be applied. Patches made with the material may be tested with a spark tester, the same manner in which the original rubber lining was tested. While Carbo-Flex 6040 is said to be excellent for repairing rubber-lined steel tanks, it cannot be used for repairing rubber belts and flexible rubber pads.

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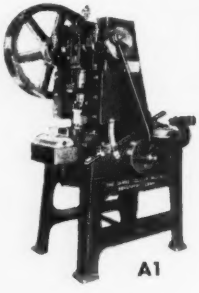
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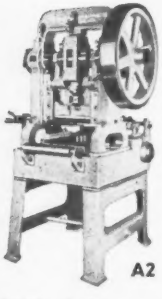
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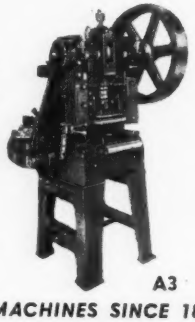
MODEL A-2
Cutting Multiple Heels, Half and Full Soles with stock grain.

MODEL A-3
Cutting Multiple Heels and Taps with or across stock grain.

MODEL A-2s
(Not illustrated)
Cutting across grain of stock.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COULTER PRODUCTION MACHINES SINCE 1896

NEW EQUIPMENT

Shredding Machine for Rubber

Originally designed for shredding all types of paper and paper-board materials, and non-paper materials such as foil and cellophane, the Shredmaster machines made by the Shredmaster Corp., 205 Willoughby Ave., Brooklyn 5, N. Y., are beginning to find applications in connection with the shredding of rubber, leather, textiles,

felt and similar materials. Available in both heavy-duty and table models, the Shredmaster features noiseless operation, with no impact, no pounding, and no dust. Operation is simple through a drum switch control. Operation is also safe, since all parts are completely enclosed and the machine will not run when the safety guard is raised. Under normal usage, blade sharpening is not required for one to two years of operation. Cutting width of the unit ranges from 9 to 21 inches, depending on model, while width of shreds is infinitely variable. Conveyor attachments can be supplied if desired. The company's standard table model is illustrated herewith.

Ross Liquid and Semi-Paste Mixer

In response to the demand for larger mixing capacities resulting from the speed-up of production cycles, a new 1,000-gallon direct Motor Driven Liquid and Semi-Paste Mixer, No. 36, has been designed by Charles Ross & Son Co., Brooklyn, N. Y. Available in sizes from 50 to 1,500 gallons (or larger), the mixer, with slight changes in the stirrer arrangement, can be used also as an agitated storage tank in the larger sizes. Paste or liquid type stirrers can be furnished, as desired, and the unit may be mounted through the floor or otherwise to suit space and other requirements. The motor is a right angle gearhead reduction type and is directly connected to the stirrer shaft. This arrangement makes for a more compact unit and eliminates intermediate parts such as chain drives and gears, thereby minimizing breakdown possibilities. The stirrers are especially designed to give a most thorough blending in minimum time. With stirrer types chosen for specific requirements, these No. 36 Mixers are reported to give excellent results over a wide range of mixing consistencies and conditions.

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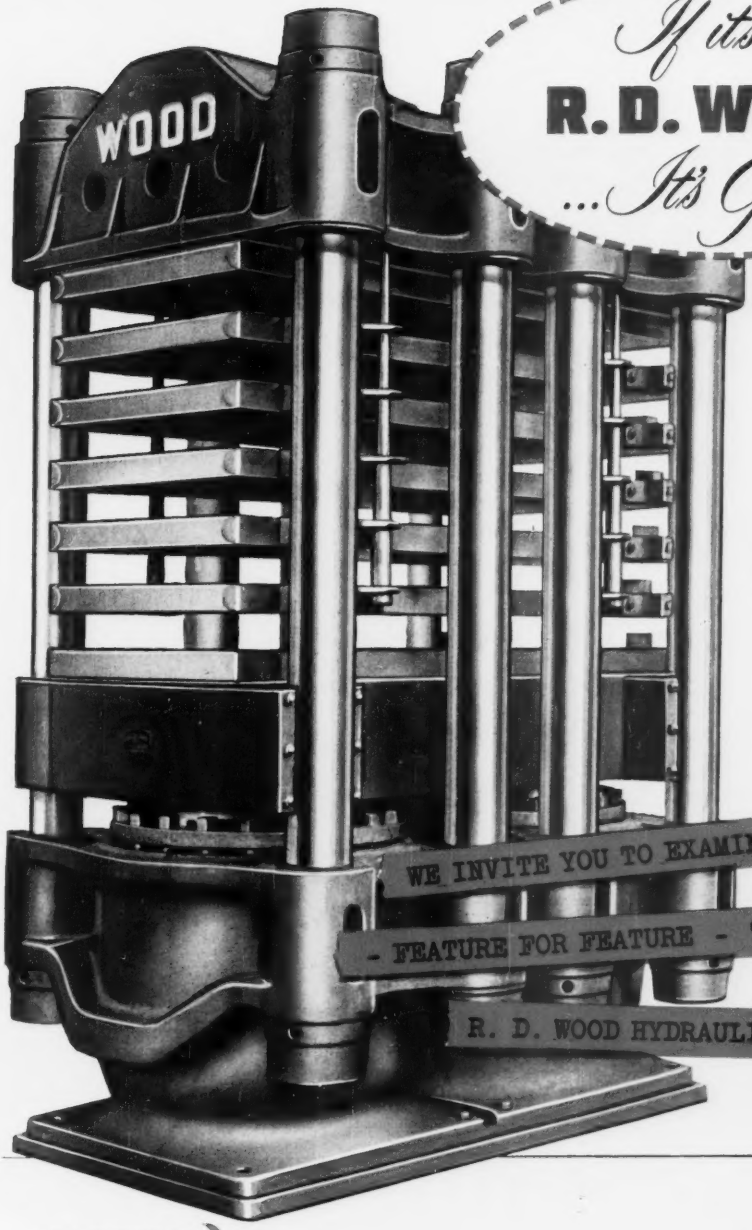

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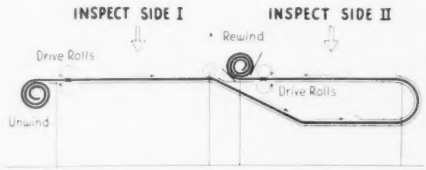
Riverside Inspection Table

An inspection table which is said to cut by 25% the time required to inspect coils of strip metal has been announced by the Riverside Metal Co., Riverside, N. J. Although designed specifically for inspecting coils of strip metal, the table arrangement can be modified to

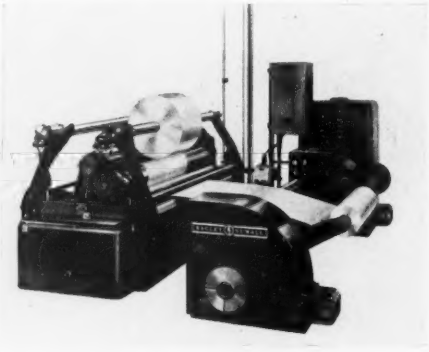


service textile, rubber, linoleum, roofing paper and other fields in which material must be unrolled for inspection.

Formerly, to inspect coil strip, small coils were unwound; inspected on one side; turned over; inspected on the other side; and rewound. Large coils were unwound; inspected on one side; rewound; then unwound again; inspected on the other side; and rewound. Now, by guilding the strip as shown in the illustration, both sides are inspected in one operation, eliminating both turnover and rewinding. Unnecessary handling operations have been eliminated and inspection time has been cut at least 25%.

B & S No. 55 Shaftless Backstand

An entirely new concept in mill roll unwinding is presented in the No. 55 Shaftless Backstand manufactured by Bagley & Sewall Co., 500 Fifth Ave., New York 18, N. Y. Several new features on the unit are said to combine to reduce the downtime on mill roll changing



to a minimum. The No. 55 Backstand includes automatic tension and side register control. There is a motor for raising and lowering mill roll arms, and one for moving the arms to accommodate different width rolls. The entire working mechanism is enclosed. The unit is usable with any type of rewinding machine as well as with waxing and laminating equipment, etc.

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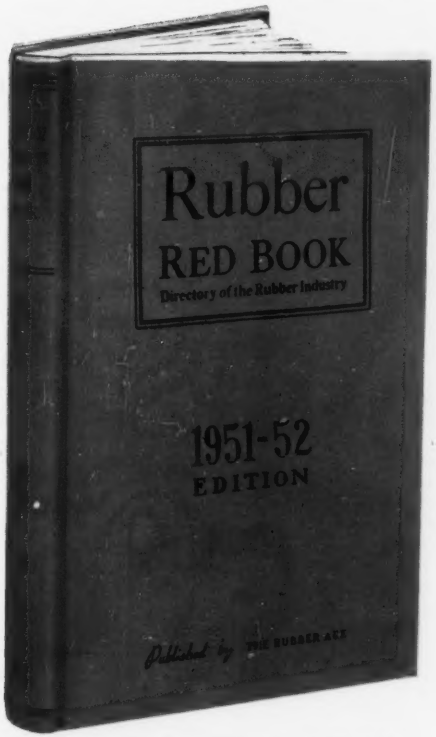

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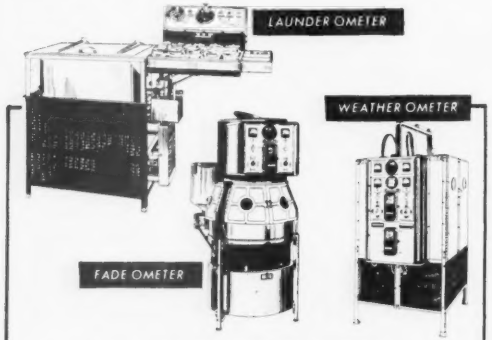

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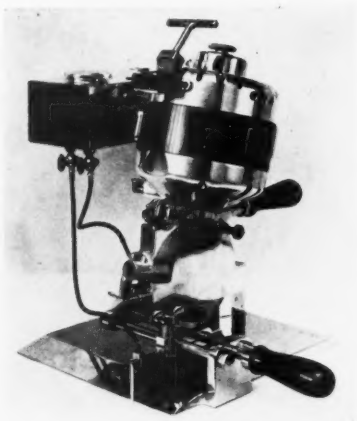
Equipped with an adjustable gauge, the Class RS Strip Cutter manufactured by the Eastman Machine Co., Washington and Goodell Sts., Buffalo 3, N. Y., finds use in cutting strips ⅛ to 5 inches in width from rubber slabs up to 1-inch thick. The unit is equipped with a



moistening device which lubricates the face of the gauge and the knife. In operation, the rubber is placed on the flat smooth table of the machine. The lubricating container is filled with soapy water and the gauge set to the width desired. Both petcocks on the container are opened to permit a liberal flow of the liquid on gauge and knife. The handle on the side of the machine is used to press the gauge lightly against the edge of the material and propel the machine forward through the material with the handle in the rear. Strips cut with this machine will have a perfectly square smooth cut and can easily be held within limits of .015-inch of the required width.

Team Work!

SEE PAGE 644

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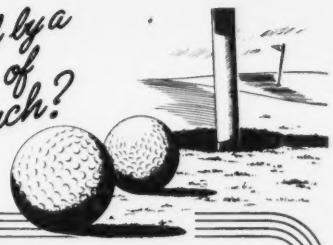

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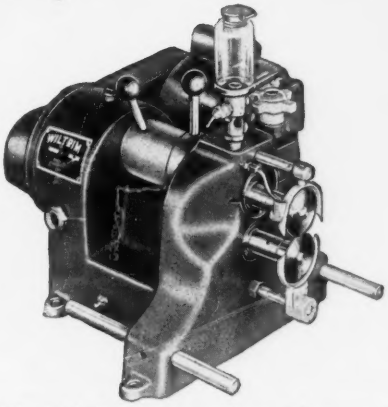

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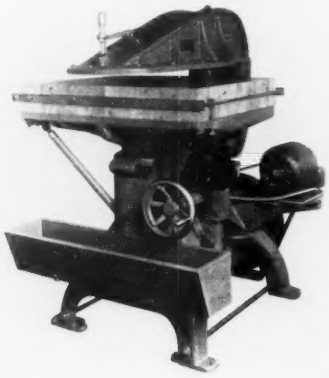
Designed for cutting operations in the manufacture of such products as rubber overshoes, gaskets and leather goods, clicking machines built by the L. F. Fales Machine Co., Walpole, Mass., are constructed with alloy cast iron parts to give maximum service life along with high-speed and precision cutting. The Style B unit has arms which are 13½, 18 or an extra wide 24 inches. The



tables are 18 by 36 inches, 20 by 40 inches, or 27 by 26 inches. Unless otherwise specified a 5-inch thick hard wood maple cutting block is furnished the same size as the table specified. The Style B unit, as illustrated herewith, has a ½ or 15/16-inch stroke. This model, however, can be equipped with a special extra long 1½-inch stroke for special work. Dies up to 1¼ inches in height can be used. Depth of the die depends upon the thickness of the material to be cut. All clicking machines produced by the company are furnished with right hand motor bracket for individual motor drive with or without 1 or 1½ hp motor. Style B unit requires floor space 44 inches wide and 50 inches deep. The overall height of the unit is 59 inches.

Velan Universal Steam Trap

Weighing 8½ pounds, the Velan Universal Steam Trap manufactured by the Velan Engineering Co., 1216 Drummond St., Montreal, Que., Canada, is said to have the same efficiency and capacity of ordinary 2-inch traps weighing up to 200 pounds. Seven different devices are combined in the one small unit. These are: (1) Steam trap; (2) Air bypass valve; (3) Check valve; (4) Self-cleaning strainer; (5) Flow control glass; (6) Temperature indicator gauge; (7) Temperature control. The valve is opened by steam pressure and closed by thermal action. The Bimetal element operating the valve is a function of the saturated steam curve so that one trap can be used for a very wide range of steam pressures and temperatures. It can handle pressures of 650 psi and temperatures up to 1,000° F. On the outlet of the trap there is a specially designed temperature gauge which accurately shows the discharge temperature at all times. This discharge temperature can be regulated through a wide range by means of an adjustment device on the outside of the trap.

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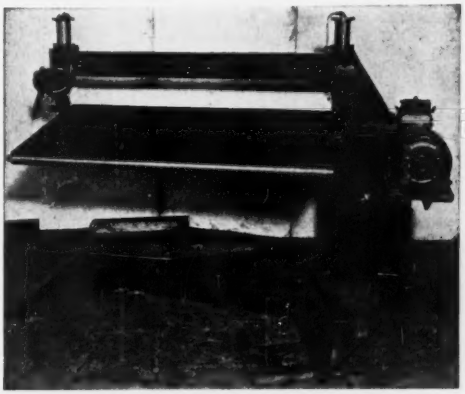

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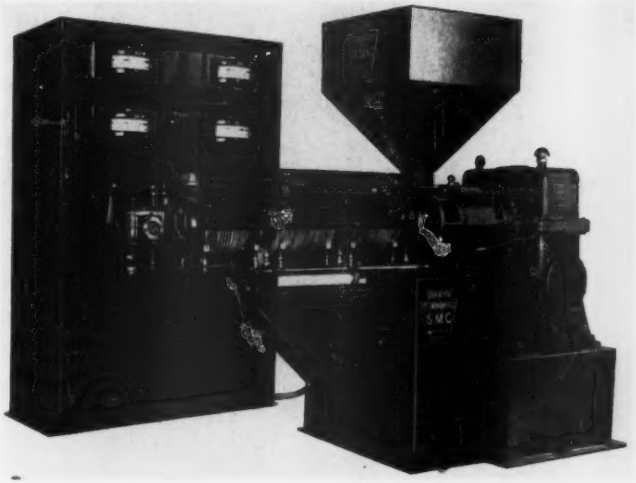

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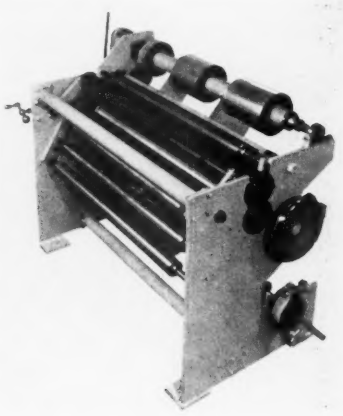

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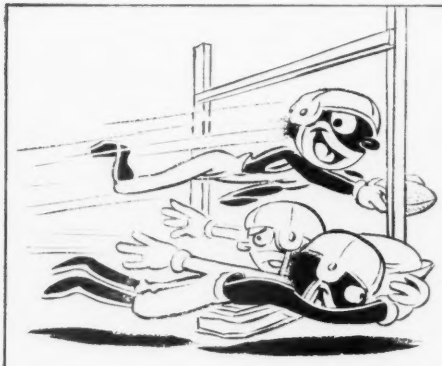
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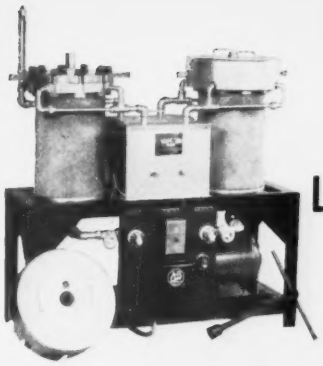

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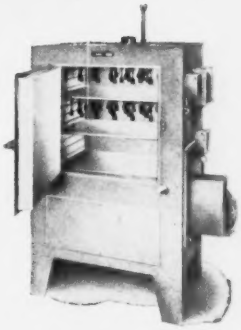

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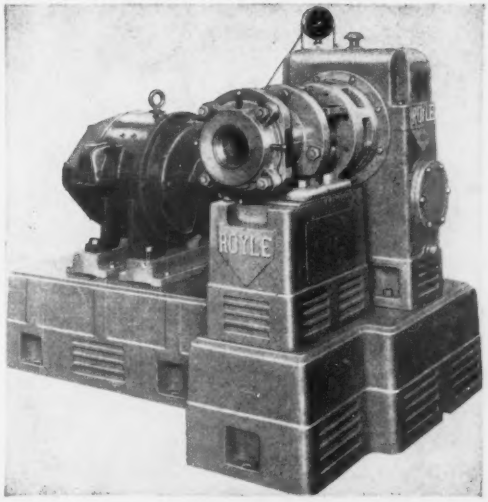

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REVIEWS

BOOKS

Payment by Results. (Studies and Reports, New Series No. 27). Published by the International Labour Office, Geneva, Switzerland. Available from the International Labor Office, 1825 Jefferson Place, N.W., Washington 6, D. C. 6¼ x 9¼ in. 204 pp. $1.25.

Systems of payment by results are now widely used in many countries and increasing recognition of the need to raise the productivity of labor has led to a growing interest in the possibilities of such systems. The International Labor Office has prepared this present report in order to provide governments, employers, and other interested parties with up-to-date information concerning the various types of systems now in use, the procedures used in introducing and applying them, the extent to which they are used in various countries and industries, their effects on output and workers' earnings, their advantages and disadvantages, and the various provisions which have been found necessary to safeguard the interests of employers and workers. The first part of the report, comprising the first seven chapters, has been prepared by the International Labor Office, mainly on the basis of information supplied by governments, employers, and workers' organizations in response to a special inquiry undertaken by the Office. The second part of the report contains a statement of general principles concerning the use of payment by results which was drawn up by a meeting of experts on such systems held under the auspices of the Office at Geneva in April, 1951.

•

Industrial Water Pollution: Survey of Legislation and Regulations. Published by Chemonomics, Inc., 400 Madison Ave., New York 17, N. Y. 6 x 9 in. 142 pp. $5.00.

Compiled by the staff of R. S. Aries & Associates, consulting engineers and economists with offices in New York City, this book lists and discusses the regulations on water pollution now in effect in every state and territory of the United States. Here, in one volume, are all the essential facts on pollution laws, listed in alphabetical order of the states. The book is a ready reference work, presenting in concise, clear language, the various definitions of water pollution formulated by each state, the measures necessary to comply with the state's regulations, the enforcement procedures enumerated in the laws, and the steps which must be taken by manufacturers to abate water pollution. The Federal Standard is discussed in detail, since it serves in many cases as the model for existing or contemplated water pollution regulations. The water standards of interstate agencies are also included in the book. A complete list of all state agencies concerned with water pollution is found for easy reference in the index.

•

An Introduction to the Chemistry of the Silicones. (Second Edition). By Eugene G. Rochow. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 6 x 9¼ in. 214 pp. $5.00.

In his critical survey of the field, Dr. Rochow reviews the silanes and their derivatives and emphasizes the commercially important silicone polymers. In addition to giving methods for their preparation, their chemical and physical properties, and their uses, he investigates the possibilities for large scale production and covers the various methods of analysis. To bring the new edition up to date, the author has included new material on the carbon-silicon bond, the synthesis of organosilicon compounds, and the physical chemistry of silicones. He has also supplied enlarged tables of physical properties of organosilicon compounds.

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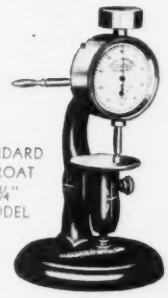

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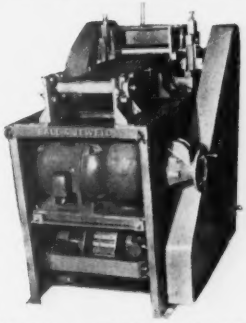

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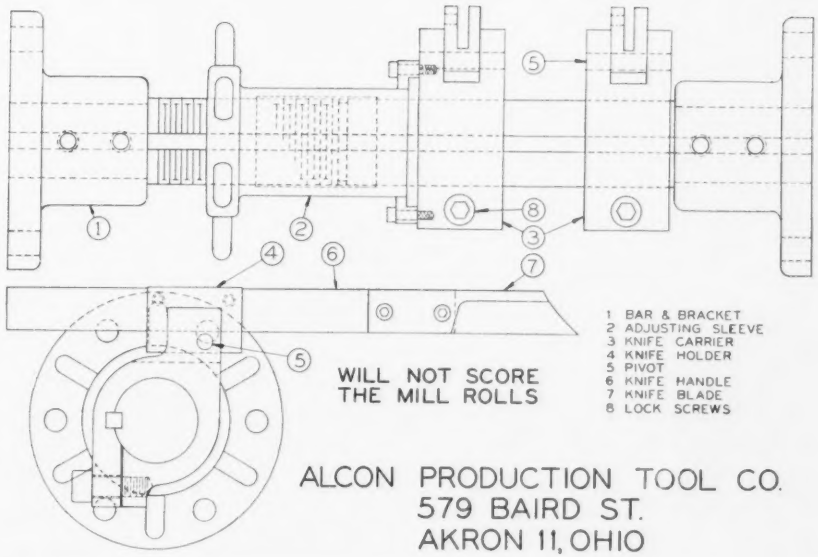

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BOOKLETS, CATALOGS, etc.

Petroleum Facts and Figures. (Ninth Edition, 1950). Published by the American Petroleum Institute, 50 West 50th St., New York 20, N. Y. 6 x 9 in. 491 pp.

The tremendous growth of the petroleum industry makes it important to have available, in one volume, as many facts and figures about the industry as possible. The ninth edition of this book is presented to meet that need. The publishers have made every effort to provide complete and accurate information on the industry—both current facts and as much historical data as the records yield. This publication supercedes previous editions, and its purpose is to serve as an authoritative reference work for oil men, students, educators, and all others who have an interest in petroleum.

•

Calcium Carbonates and Calcium Oxides. Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York 13, N. Y. 6¾ x 10 in. Approx. 140 pp.

This valuable data book covers the subjects of domestic, imported and precipitated calcium carbonate in one volume. It is divided into four sections: natural sugar calcite, imported natural chalk (whiting), precipitated calcium carbonate, and calcium oxide (lime). Charts, tables of physical constants and chemical compositions, as well as detailed descriptions of uses and values, are given for each carbonate. Practically every question that a manufacturer might ask about the uses, properties and availability of the various calcium carbonates and calcium oxide is answered in this comprehensive book.

•

Planning for Peak Production. (Booklet No. 197). American Management Association, 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 48 pp. $1.00 (members), $1.25 (non-members).

This booklet reproduces a series of papers which were presented at the Production Conference of the American Management Association in New York, N. Y., on March 26-27, 1951. The meeting revolved around two central themes: (1) Achieving Increased Operating Effectiveness; (2) The Impacts of the Wage Freeze. Each of the papers which were heard at the conference are published in this interesting booklet, together with the questions which were asked from the floor and the answers given by the authors.

•

Air Separation Plants for Oxygen, Nitrogen and the Rare Gases. Low Temperature Division, Petrocarbon, Ltd., Partington Industrial Estate, Urmston, Manchester, England. 8½ x 11 in. 12 pp.

The air separation plants described in this booklet are the first of their kind to be produced regularly in Great Britain on a normal commercial basis. Air separation plants of the various types are illustrated and described: Type R, small plants to supply liquid nitrogen for use as a low-temperature refrigerant in research laboratories; Type S, small gaseous oxygen plants for use by engineering establishments, etc., to supply oxygen for welding, cutting, etc.; Type D, medium-sized oxygen or nitrogen plants; and Type T, large oxygen or nitrogen plants.

•

Anhydrides. (Booklet No. F-5280A). Carbide and Carbon Chemicals Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 20 pp.

This booklet describes all of the anhydrides offered by Carbide and Carbon. It describes their uses, physical properties and shipping data. The booklet also has a bibliography which lists all the important references to anhydrides in the chemical literature. An important feature of the booklet is a section covering the specifications of anhydrides, with a complete description of the test methods used. This section contains not only the standard ASTM test methods but also some new methods developed in the company's own laboratories.

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LONDON

THE RUBBER INDUSTRY owes its development largely to scientific and technical research and the Institution was founded in 1921 to foster scientific and technical advancement and to disseminate the results.

THE INSTITUTION TODAY is the centre of a great fraternity of rubber manufacturers, scientists, technologists, research establishments, executives and students from every country whose object is the advancement of the cause of the rubber industry throughout the world.

OBJECTS: To promote corporate and concerted effort in the industry by bringing together all those engaged or interested in the various branches of science and technology on which the Industry is based and co-ordinating their respective contributions.

To promote the profession and practice of Rubber Technology.

To encourage the extension of scientific and technical education in the principles and details of rubber manufacture.

To maintain a scheme of Diplomas for the recognition of efficiency in knowledge of all branches of technology essential to the successful maintenance and development of rubber manufacture.

To arrange for the holding of meetings, the reading of papers and the giving of lectures with subsequent discussions and publication.

To foster the systematic study of scientific and technical problems involved in the various phases of the manufacture of natural and synthetic rubbers and rubber-like materials and their conversion into finished products.

To encourage original work and research dealing with the manufacture of rubbers.

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Proceedings of Rubber Technology Conferences.

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REVIEWS (CONT'D)

Link-Belt Vibrating Screens. (Book No. 2377). Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. 8½ x 11 in. 20 pp.

The fast, accurate dry-screening of light and fine materials with the company's Model "UP" and Model "NRM" Liquid Vibrating Screens is described in this book. Descriptive material includes specific information on how to select the right screen and screen cloth for maximum operating efficiency; dimension tables, weights, and horsepower requirements, and other data of value to the engineer and plant operator. The book also shows a variety of actual installations. These include sizing, scalping, removing foreign matter, reclaiming oil well drilling mud, and removing solids from factory waste water to recover usable and/or avoid pollution of streams and waterways. The book is profusely illustrated.

•

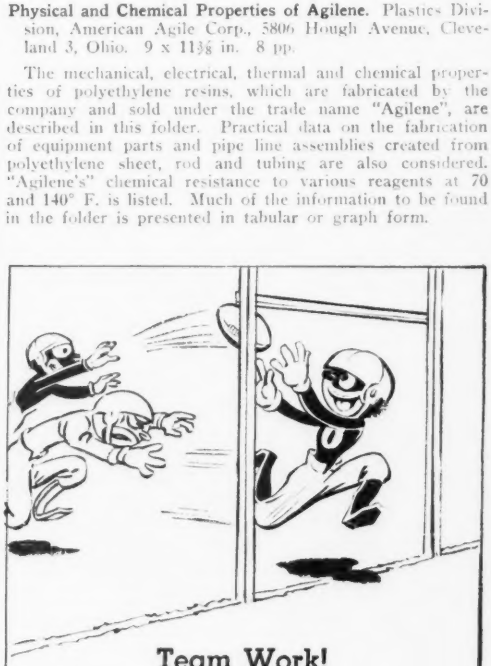
Instructions and Technical Data for Gould Rubber Jar Batteries. Gould-National Batteries, Inc., Trenton 7, N. J. 5¼ x 7⅝ in. 56 pp.

This handbook of technical instructions and engineering data covers the care of motive-power storage batteries. The first section of the publication has to do with care and operation of the lead acid storage battery. Maintenance repairs are next considered followed by a discussion of repair parts and tools. A section on technical data tabulates battery-charger ampere-hour-meter settings required to give the battery correct charge. Other charts catalog battery capacities in terms of ampere hours, amperes, and kilowatt-hours at both the 6-hour and 8-hour discharge rates. The charts give data for batteries having from 9 to 41 plates per cell for 8 different battery models.

•

Physical and Chemical Properties of Agilene. Plastics Division, American Agile Corp., 5806 Hough Avenue, Cleveland 3, Ohio. 9 x 11⅜ in. 8 pp.

The mechanical, electrical, thermal and chemical properties of polyethylene resins, which are fabricated by the company and sold under the trade name "Agilene", are described in this folder. Practical data on the fabrication of equipment parts and pipe line assemblies created from polyethylene sheet, rod and tubing are also considered. "Agilene's" chemical resistance to various reagents at 70 and 140° F. is listed. Much of the information to be found in the folder is presented in tabular or graph form.



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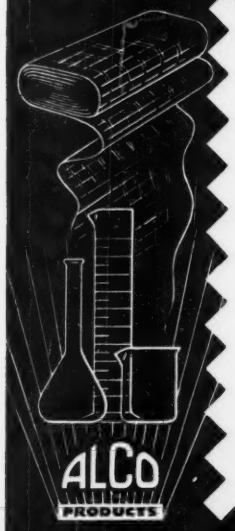

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NEW YORK, SEPT. 10, 1951

Natural Rubber

The recent statement by Senator Lyndon Johnson (Dem., Tex.) concerning the inadequacies of the government stockpile has caused speculative interests to voice bullish hopes. Senator Johnson is chairman of the Preparedness Subcommittee of the United States Senate Armed Forces Committee. Domestic trade sources, however, doubt that the Senatorial discussions will force the General Services Administration to enter the foreign markets. A report of Senator Johnson's statement and counter-statement appears elsewhere in this issue.

Trade sources also point out that the current rise in primary market prices for natural rubber has worked a 10c a pound spread between the world market price and what GSA is willing to pay. Despite curtailed GSA purchasing during recent weeks, the trade believes that there is plenty of rubber available for domestic consumption and stockpiling requirements.

Purchases made months ago are still arriving in local ports in quantities large enough to cause distribution problems at the docks. Most dealers find it difficult to reconcile Senator Johnson's statement that the United States should speed its stockpiling rate, with recent remarks by Jess Larson, GSA Administrator, and W. Stuart Symington, RFC head, that stockpile requirements are approaching their goal and synthetic production nearing desired capacity.

World consumption of natural rubber in the first seven months of 1951 has been estimated at 940,000 tons as against world production of 1,117,500 tons, a difference of 177,500 tons. World stocks of natural rubber at the end of July totaled about 10,000 tons less than they were at the end of the first seven months of 1950. World consumption of natural and synthetic rubber for the first seven months of 1951 totaled 1,370,000 tons, about 125,000 tons greater than for the corresponding period of the previous year.

Producing interests as well as leaders in the world rubber trade are confident that the trend is toward progressive increases in world rubber consumption. It is for this reason that there is far less uneasiness than might be expected in producing areas over the trend toward increased synthetic production in the United States. Some price irregularities may ensue when the United States relinquishes its position as the sole purchaser of rubber. However, it is felt that increasing world consumption will absorb the increased supplies.

While rubber shipments to the United States during the month of August showed a small increase from the month before, the official figures for ocean shipments from Malaya show almost record shipments to the United Kingdom.

Quotations for the markets in London and Singapore follow:

London Market

(Standard Smoked Sheets)

October	58.04	58.33
October-December	56.87	57.17

Singapore Market

(Standard Smoked Sheets)

October	53.25	53.56

Scrap Rubber

Since our last report, scrap rubber dealers were given until August 23 to clear out old inventories of scrap rubber at prices higher than the new ceilings which went into effect on August 13. OPS said the extension of the deadline by 10 days was made because delays in the distribution of the regulation prevented the trade from learning details of the regulation in time to move higher priced inventories and avoid a loss. OPS-set prices for scrap rubber follow:

(Prices Delivered Akron)

Mixed tires	ton	$26.00
Mixed beadless tires	ton	34.00
Light colored carcass	ton	130.00
Black carcass	ton	50.00
No. 1 peelings	ton	65.00
No. 2 peelings	ton	42.00
No. 3 peelings	ton	38.00
Buffings	ton	30.00
Truck and Bus S.A.G.	ton	28.00
Passenger S.A.G.	ton	28.00
Mixed S.A.G.	ton	26.00
Light colored tubes	lb.	.16
Natural rubber red tubes	lb.	.16
Natural rubber black tubes	lb.	.11½
Mixed natural rubber tubes	lb.	.10
Butyl rubber tubes	lb.	.057
GR-S rubber tubes	lb.	.02
Mixed synthetic tubes	lb.	.03

Reclaimed Rubber

Latest figures by the Department of Commerce indicate that during the first five months of 1951 a total of 160,560 tons of reclaimed rubber were consumed. This compares with the 107,474 tons of reclaim consumed in the first five months of the previous year. The Department estimates that 34,207 tons were consumed in May against the 32,428 tons which were consumed in April. OPS-established prices for reclaimed rubber follow:

(Prices for All Areas Except Calif.)

Premium Grade Whole Tire	.10½
First Line Whole Tire	.10
Second Line Whole Tire	.09½
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.08¾
Black Carcass	.14½
No. 1 Light Colored Carcass	.20¼
No. 1 Select Peel	.11¾
No. 1 Peel	.10½
Butyl Tube Reclaim	.14½
S.P. Natural Rubber Black Tube	.21
Natural Rubber Black Tube	.20
Natural Rubber Red Tube	.24¼
Natural Rubber Gray Tube	.24¼

Cotton Tire Fabrics

There has been a moderate quickening of activity in the cotton tire fabric market within the past few weeks due, in part, to assurances of a large cotton crop. With the decline in cotton prices during the past few weeks, prices for cotton tire fabrics have been adjusted to more accurately reflect current conditions. Current quotations follow:

Standard, Peeler, 12-4/2	lb.	.82
Extra Staple, Peeler, 12-4/2	lb.	.87

Chafers

14.4 oz. (per sq. yard)	lb.	77½
9.25 oz. (per sq. yard)	lb.	74
11.65 oz. (per sq. yard)	lb.	71
8.9 oz. (per sq. yard)	lb.	75½

Cotton

The price of middling uplands on the New York Cotton Exchange has swung in a range of 1.45c since our last report (August 8), high for the period being 36.50c reached on August 21, and low being 35.05c reached on September 4 and again on September 5. The average price of middling uplands for the month of August was 35.93c based upon 23 trading days. This compares with an average of 41.21c in the month of July.

On September 10, the Department of Agriculture estimated this year's cotton crop at 17,291,000 bales of 500 pounds gross weight each. This figure is 25,000 bales more than the 17,266,000 bales forecast a month ago. It compares with last year's very small crop of 10,012,000 bales and with the 1940-49 average of 12,030,000 bales. Production was boosted this year under a government appeal for more cotton to prevent an acute shortage. The department's forecast indicated an acre yield at 290.8 pounds, compared with 269.2 pounds last year and 265.9 for the ten-year average.

International trade in cotton is expected to expand rapidly during the next few months, as soon as Congress completes appropriations for financing exports abroad. Stronger efforts wil lbe made to finance cotton through the Export-Import Bank. Due to the relatively high prices for cotton, international cotton houses are expected to use the cotton futures market to a much greater extent. The recent rise of Cotton Exchange memberships from $7,500 to $16,000 attests to the growing interest in price protection.

The International Cotton Advisory Committee said recently that world consumption of cotton in 1951-52 may be only moderately below the record 33,000,000 bales used in 1950-51.

Quotations for middling uplands on the Exchange follow:

	Aug. 8	September 10		
	Close	High	Low	Close
Oct.	34.35	34.54	34.19	34.34
Dec.	34.34	34.61	34.26	34.40
Mar.	34.36	34.82	34.47	34.62

Synthetic Rubber

(Dry Types—Per Pound)

Butaprene NF	.465 - .475
Butaprene NL	.475 - .485
Butaprene NAA	.515 - .525
Butaprene NXM	.550 - .560
Chemigum 30N4NS	.400 - .470
Chemigum 50N4NS	.400 - .470
Chemigum N3	.450 - .520
G.E. Silicone Rubber (compounded)	3.20 - 4.40
G.E. Silicone Gum (not compounded)	5.00
GR-I	—— - .2075
GR-S	—— - .260
Hycar OR-25	.450 - .460
Hycar OR-15	.520 - .530
Hycar OS-10	.500 - .510
Neoprene Types CG and AC	—— - .590
Neoprene Type E	—— - .650
Neoprene Types FR and KNR	—— - .800
Neoprene Type GN	—— - .380
Neoprene Type GN-A	—— - .380
Neoprene Type RT	—— - .400
Neoprene Type S	—— - .380
Neoprene Type W	—— - .400
Paracril B	.500 - .510
Paracril BJ	.500 - .510
Paracril C	.580 - .590
Silastic (compounded)	2.35 - 4.40
Thiokol Type A	—— - .470
Thiokol Type FA	—— - .640
Thiokol PR-1	—— - .950
Thiokol Type ST	—— - 1.000

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS										RE-EXPORTS		TOTAL NET IMPORTS
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule						
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,640	125,373,864	14.08	11,944	4,168,127	15.58	2,508	628,886	11.19	412,092	5,652	1,799,124	406,440
1939	469,946	167,586,780	15.92	27,437*	10,467,552	17.03	2,233	461,345	9.27	499,616	13,125	5,832,618	486,491
1940	781,202	303,308,823	17.33	33,789	14,593,466	19.28	3,633*	758,007	9.31	818,624	7,060	3,197,136	811,564
1941	989,498	401,976,317	18.14	34,797*	15,965,627	20.48	4,881	1,145,767	10.48	1,029,176	5,376	2,757,872	1,023,800
1942	266,276	112,537,426	18.87	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,445	10,856	5,913,386	271,589
1943	50,358	31,369,198	27.81	1,890	1,312,202	31.00	7,678*	3,636,789	21.14	59,926	22,583	16,446,707	37,343
1944	103,847	73,908,549	31.77	3,091	2,092,211	30.99	6,701*	3,351,233	22.33	113,639	9,739	8,712,695	103,900
1945	134,408	95,814,102	31.82	4,733	3,115,853	30.22	10,040	5,963,797	26.52	149,221	9,509	7,201,746	139,712
1946	366,415	222,552,939	27.12	8,421	5,843,085	29.14	5,344	2,859,246	23.89	380,180	7,711	5,331,954	372,469
1947	691,087	306,951,814	19.83	17,542	9,787,722	30.98	2,884	1,492,825	23.11	711,513	4,121	2,354,494	707,392
1948	702,293	290,849,177	18.49	32,745	9,820,080	24.93	302	71,330	10.53	735,340	6,672	3,259,324	728,668
1949	630,818	225,341,459	15.95	29,974	14,970,478	22.30	.....	.....	.....	660,792	6,253	2,746,109	654,539
1950	751,966	418,794,962	24.85	51,627	39,717,410	34.34	740	254,331	14.54	803,593	8,640	6,832,821	794,953
1950:													
Mar.	57,831	21,120,732	16.30	3,650	1,826,747	22.34	....	.....	....	61,481	659	326,688	60,822
Apr.	72,418	27,412,444	16.89	4,395	2,199,149	22.34	175	47,117	12.02	76,988	639	340,781	76,349
May	56,804	21,822,118	17.15	3,183	1,904,513	26.71	200	58,948	13.16	60,187	597	289,551	59,590
June	73,806	31,525,162	19.07	3,965	2,294,158	25.83	105	33,651	14.31	77,876	625	322,008	76,451
July	53,245	27,256,854	20.11	4,225	2,710,430	28.64	70	26,836	17.11	57,540	683	381,650	56,857
Aug.	67,415	36,092,742	23.90	5,253	3,721,184	31.62	35	9,671	12.34	72,703	1,005	914,279	71,698
Sept.	55,981	36,724,072	29.23	5,117	4,369,707	38.12	55	15,148	12.34	61,153	879	798,935	60,274
Oct.	73,205	53,151,003	32.41	5,161	5,485,816	47.46	10	7,496	33.18	78,376	564	500,623	77,812
Nov.	68,462	62,121,636	40.51	4,456	6,227,022	56.71	29	21,618	33.46	72,947	604	724,050	72,343
Dec.	65,282	66,092,508	45.11	3,954	5,191,321	58.62	25	24,864	44.40	69,236	1,400	1,757,047	67,836
1951:													
Jan.	84,864	90,707,863	47.72	7,502	10,283,208	61.18	88	84,927	43.01	93,366	819	1,150,246	92,547
Feb.	49,217	55,013,580	49.90	5,347	8,314,086	64.91	123	119,086	43.27	54,687	552	790,245	54,135
Mar.	55,574	63,104,361	56.92	7,379	11,140,554	67.40	100	100,048	44.61	62,553	322	449,703	62,231
Apr.	48,931	55,238,582	50.31	5,850	9,604,002	73.29	182	183,311	44.93	54,963	3	3,942	54,960
May	37,737	44,187,969	52.27	4,534	7,584,613	74.67	99	89,285	36.16	42,370	7	11,132	42,363

Source: U. S. Department of Commerce. * Adjusted to agree with total gross imports.

Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule. (3) In the years 1940 through 1943, crepe sole rubber imports were reported under a separate classification. Such imports, which are included under natural rubber, dry above, were: 856,294 pounds, valued at $191,097 in 1940; 379,607 pounds, valued at $85,924 in 1941; 662,503 pounds, valued at $159,530 in 1942; and 21,653 pounds, valued at $5,215 in 1943.

Natural Rubber
(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	804,143	720,268	8,644	91,434
1950:				
Feb.	53,393	56,580	558	104,477
Mar.	61,481	60,859	659	101,691
Apr.	76,998	57,914	639	106,124
May	60,599	63,813	597	100,776
June	77,876	63,333	625	99,457
July	61,660	61,402	683	93,653
Aug.	72,973	64,297	1,005	87,146
Sept.	61,148	61,281	879	87,409
Oct.	78,376	69,178	564	83,215
Nov.	73,393	51,340	604	81,658
Dec.	67,895	44,999	1,400	91,434
1951:				
Jan.	92,434	44,586	819	93,079
Feb.	54,564	47,572	552	87,242
Mar.	62,904	35,335	332	76,312
Apr.	54,781	39,508	185	71,679
May	41,687	42,739	151	68,923

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,148	9,132	2,944,504	444	204,583
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	....	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	.....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1950:						
Jan.	61	42,855	37	18,308	56	35,288
Feb.	42	24,040	162	123,570	30	20,291
Mar.	90	66,374	113	97,008	17	13,672
Apr.	68	45,844	246	211,744	30	23,369
May	78	50,093	114	103,796	69	86,151
June	143	74,936	120	104,123	49	112,902
July	109	53,480	118	101,258	64	87,284
Aug.	171	102,985	234	200,912	46	41,790
Sept.	119	102,475	175	146,493	37	59,004
Oct.	372	311,959	174	132,632	64	146,707
Nov.	235	588,135	214	183,907	51	102,599
Dec.	124	126,709	82	91,411	28	16,361
1951:						
Jan.	242	200,534	184	227,244	108	118,988
Feb.	86	76,034	128	214,803	12	11,014
Mar.	30	22,838	192	222,934	33	65,143
Apr.	364	241,225	86	180,518	43	39,402
May	306	200,459	130	194,904	26	22,515

Source: U. S. Department of Commerce.

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Synthetic Rubber—Totals

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	572	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699[a]	72,920	114,963
1947	508,702	1,093	559,566	11,385	62,366
1948	488,343	15,671	442,072	4,874	115,111
1949	393,690	17,242	390,855	6,483	98,042
1950	476,184	25,722	538,289	7,652	52,758
1950:					
Dec.	52,199	1,603	53,364	747	52,758
1951:					
Jan.	60,952	1,509	59,584	570	55,453
Feb.	56,415	1,267	53,308	615	59,035
Mar.	65,286	1,152	65,587	526	60,614
Apr.	66,414	1,148	58,787	554	65,793
May	70,541	518	66,267	596	72,098

Source: Rubber Division, OMD, and Predecessor Agencies.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. [a] Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	62,824	6,618	509,795
1948	405,492	34,848	56,662	7,012	504,014
1949	310,599	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906

Consumption

1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666
1948	345,313	32,118	58,870	5,771	442,072
1949	299,420	31,753	50,855	8,827	390,855
1948	345,313	32,118	58,870	5,771	430,618
1949	299,420	31,753	50,855	8,827	397,139
1950	416,230	43,781	66,348	11,930	538,289

Exports

1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	797	72,697
1947	7,951	2,617	62	755	11,385
1948	1,093	2,875	21	885	4,874
1949	1,401	3,330	178	1,574	6,483
1950	900	4,826	31	1,895	7,652

Stocks at End of Period

1943	30,975	6,415	1,033	3,145	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,755	115,186
1947	40,606	5,237	13,184	3,339	62,366
1948	96,282	5,072	10,995	2,762	115,111
1949	77,771	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758

Source: Rubber Division, OMD, and Predecessor Agencies.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1944	1945	1946	1947	1948	1949	1950	1951
Jan.	47,540	52,008	51,746	57,057	61,308	63,125	66,908	80,554
Feb.	47,754	48,886	47,654	50,551	56,487	57,980	63,366	72,717
Mar.	52,263	55,364	56,703	59,947	68,171	73,282	78,739	86,486
Apr.	50,005	59,024	62,111	64,140	72,183	75,318	80,348	87,430
May	54,250	60,748	66,800	70,865	77,186	81,665	89,033	100,188
June	54,266	60,580	63,247	71,329	78,044	83,374	90,010	96,093
July	55,119	66,170	60,076	73,441	81,428	82,129	91,707	.....
Aug.	55,618	70,058	66,729	72,089	80,351	84,707	94,537	.....
Sept.	56,318	64,529	62,268	71,384	76,159	80,832	86,766	.....
Oct.	53,154	55,708	66,637	73,277	75,164	79,327	89,126	.....
Nov.	54,967	53,543	61,345	64,158	72,560	76,346	82,718	.....
Dec.	52,250	49,745	61,103	67,506	72,162	75,628	80,994	.....
Total	633,482	696,333	725,417	795,015	871,370	913,713	994,417	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption—Tons	Consumption—% to Crude [a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1950:					
Aug.	27,640	26,151	22.8	900	31,793
Sept.	29,746[e]	29,250	26.[illegible]	1,177	33,395
Oct.	32,710	32,785	26.5	989	33,530
Nov.	30,265	30,260	31.3	1,237	33,960
Dec.	32,632	29,905	30.4	1,241	35,708
1951:					
Jan.	33,044	32,455	31.0	1,336	35,543
Feb.	30,502	28,792	31.7	1,629	36,885
Mar.	35,294	32,678	32.4	1,475	38,334
Apr.	34,311	32,428	33.0	1,398	39,064
May	34,866	34,207	31.4	1,512	38,628

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. [a] Includes natural and synthetic rubber. [b] Includes 893 tons of imports. [c] Includes 67 tons of imports. [d] Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1931	1,973,090	416,648	2,389,738	1941	3,744,500	875,381	4,619,681
1932	1,135,491	235,187	1,370,678	1942	220,814	133,083	353,897
1933	1,573,512	346,545	1,920,057	1943	0	4,501	4,501
1934	2,177,919	575,192	2,753,111	1944	0	124,819	124,819
1935	3,252,244	694,690	3,946,934	1945	83,792	313,643	397,435
1936	3,669,528	781,862	4,451,390	1946	2,148,699	930,760	3,079,459
1937	3,915,889	892,382	4,808,271	1947	3,558,178	1,220,634	4,778,812
1938	2,000,985	485,852	2,486,837	1948	3,909,270	1,363,856	5,273,126
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1950:							
Jan.	487,824	93,323	581,147	July	595,067	111,028	706,095
Feb.	385,361	89,971	475,332	Aug.	682,782	134,853	817,635
Mar.	469,618	110,843	580,461	Sept.	616,827	105,562	722,389
Apr.	455,193	103,850	559,043	Oct.	651,169	108,815	723,984
May	575,518	120,963	696,481	Nov.	504,445	98,538	602,983
June	720,688	135,332	856,020	Dec.	521,371	118,890	640,261
1951:							
Jan.	478,589	127,583	606,172	July	381,407	110,239	491,646
Feb.	505,865	111,935	617,800	Aug.	.....	.....	.....
Mar.	617,399	136,794	754,193	Sept.	.....	.....	.....
Apr.	503,038	135,415	638,453	Oct.	.....	.....	.....
May	511,938	140,047	651,985	Nov.	.....	.....	.....
June	482,029	134,818	616,847	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1946	1947	1948	1949	1950
Passenger Car	15,058,469	21,346,004	23,842,796	27,715,344	35,096,494
Truck & Bus	5,939,244	7,737,353	6,920,231	4,238,174	6,625,129
Agricultural	1,735,992	2,633,699	3,140,882	2,695,430	2,853,483
Earth Mover	5,520	10,610	13,330	9,895	15,602
Total	22,739,225	31,727,666	33,917,239	34,658,843	44,590,618

	1951					
	Feb.	Mar.	Apr.	May	June	July
Passenger Car	2,667,575	3,400,462	2,930,710	2,645,443	2,131,958	2,158,601
Truck & Bus	515,761	633,837	658,581	642,612	548,424	571,161
Agricultural	265,807	2,207	283,561	244,342	232,354	238,983
Earth Mover	4,152	3,658	2,073	1,138	1,418	2,470
Total	3,453,295	4,348,001	3,874,925	3,533,535	2,914,154	2,971,215

Source: The Tire & Rim Association, Inc.

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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680	8,872	207	15,759	15,351	6,247
Passenger Car	910	2,734	38	3,682	2,790	4,432
Truck and Bus	5,770	6,138	169	12,077	12,561	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947 (total)	25,056	62,871	3,256	91,183	95,550	6,949
Passenger Car	19,644	52,857	1,608	74,109	77,795	5,444
Truck and Bus	5,412	10,014	1,648	17,074	17,755	1,505
1948 (total)	26,845	49,148	1,787	77,781	81,314	10,698
Passenger Car	21,589	41,295	656	63,540	66,738	8,773
Truck and Bus	5,256	7,853	1,132	14,241	14,576	1,925
1949 (total)	31,584	43,466	1,467	76,517	76,369	10,638
Passenger Car	28,129	36,440	509	65,077	65,140	8,904
Truck and Bus	3,456	7,026	958	11,440	11,228	1,734
1950 (total)	41,349	56,808	1,430	99,587	92,754	3,794
Passenger Car	36,678	47,103	642	84,423	78,598	3,050
Truck and Bus	4,671	9,705	788	15,164	14,156	743
1951:						
Apr. (total)	2,755	5,412	88	6,255	6,540	3,046
Passenger Car	2,234	2,605	33	4,872	5,108	2,255
Truck and Bus	521	808	55	1,384	1,432	792
May (total)	2,692	3,911	127	6,730	7,116	3,442
Passenger Car	2,127	3,102	58	5,338	5,588	2,507
Truck and Bus	515	809	68	1,392	1,528	935
June (total)	2,003	4,439	143	7,185	7,223	3,478
Passenger Car	1,699	4,513	80	5,691	5,672	2,493
Truck and Bus	504	926	64	1,493	1,550	985

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon[b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1948:							
Jan.-Mar.	**18,546**	**50,251**	**19,391**	**88,188**	*a*	**60,569**	**60,569**
Apr.-June	**15,585**	**45,385**	**18,213**	**79,183**	*a*	**59,759**	**59,759**
July-Sept.	29,743	45,927	*c*	75,670	*a*	63,642	63,642
Oct.-Dec.	13,321	34,424	15,879	63,624	*a*	65,258	65,258
Total	77,195	175,987	53,483	306,665	.....	249,228	249,228
1949:							
Jan.-Mar.	*d*	33,213	25,395	56,608	*a*	68,296	68,926
Apr.-June	5,309	29,114	13,617	48 040	*a*	68.269	68,269
July-Sept.	1,343	16,620	11,141	29,104	15,640	55,969	71,609
Oct.-Dec.	180	17,650	11,886	29,716	12,967	58,890	72,857
Total	6,832	96,597	62,039	163,468	28,607	251,424	281,661
1950:							
Jan.-Mar.	3,939	19,210	12,948	36,097	12,469	60,981	73,450
Apr.-June	11,077	29,498	14,071	54,646	11,510	59,966	71,476
July-Sept.	10,529	39,792	15,101	65,152	13,161	61,614	74,775
Oct.-Dec.	13,314	37,759	14,405	65,578	12,942	63,399	76,341
Total	38,859	126,259	56,525	221,473	50,082	245,960	296,476
1951:							
Jan.-Mar.	10,929	38,070	16,813	65,812	12,715	65,589	78,304
Apr.-June	.....	.....	.....	.....	.....	.....	.....
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics. (c) Included with tire cord not woven. (d) Included with chafer and all other tire fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	6,895	7,213	159	14,267	12,685	6,206
1943	6,350	12,474	189	19,014	15,014	2,626
1944	6,460	20,569	196	27,224	27,488	2,813
1945	5,988	33,906	411	40,304	41,742	3,627
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,831	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	.....
1951:						
Mar.	3,624	2,896	73	6,593	5,828	4,595
Apr.	2,758	2,788	48	5,593	5,566	4,657
May	2,692	2,823	70	5,585	5,625	5,071
June	2,597	2,828	68	5,493	5,374	5,294

Source: The Rubber Manufacturers Association, Inc.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1931	8½	4¼	6.17
1911	184	114	141.30	1932	4¾	2½	3.49
1912	140	108	121.60	1933	9⅞	2⅞	5.96
1913	113	59	82.04	1934	15⅞	8¾	12.92
1914	93	56	65.33	1935	13¾	10½	12.37
1915	79	58½	65.85	1936	23	13½	16.41
1916	102	55	72.50	1937	26⅜	14	19.39
1917	90	52	72.23	1938	17⅞	10¼	14.64
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19½	22.40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28⅜	13⅝	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅛	17⅜	26.20	1945	22½	22½	22.50
1925	121	34⅛	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¾	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98				

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1944	1945	1946	1947	1948	1949	1950	1951
Jan.	20.76	22.36	25.49	32.58	36.09	33.37	31.89	45.04
Feb.	21.34	22.29	26.57	33.91	33.63	33.41	32.79	(a)
Mar.	21.65	22.43	27.52	35.89	35.04	33.44	32.65	46.06
Apr.	21.71	21.88	28.40	35.89	38.10	33.84	33.23	46.06
May	21.63	23.30	28.17	36.51	38.57	33.73	33.64	46.06
June	23.31	23.42	29.89	37.83	38.12	33.56	34.66	46.06
July	22.53	23.27	34.11	38.03	34.89	32.99	38.11	41.21
Aug.	22.11	23.10	36.41	34.83	32.23	32.06	38.93	35.93
Sept.	22.10	23.25	37.59	32.21	31.92	30.94	41.62	.....
Oct.	22.32	23.85	36.79	32.39	32.01	30.32	40.66	.....
Nov.	22.13	24.71	31.50	34.50	32.15	30.52	43.11	.....
Dec.	22.28	25.21	33.03	36.74	32.90	31.08	43.37	.....
Average for Year	21.89	23.25	31.28	35.11	34.64	32.44	37.05	.....

Note: The Government established a ceiling price of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film[a]	Textile and Paper Coating Resins[b]	Molding and Extrusion Materials[b]	All Other[b, c]
1946	52,080	11,673	61,852	27,083
1947	66,430	17,237	73,114	27,064
1948	**98,021**	**31,085**	**73,598**	**21,147**
1949	157,544	29,470	81,842	19,792
1950	227,149	46,044	113,889	21,868
1951:				
Feb.	12,978	3,260	9,916	1,247
Mar.	15,359	3,959	11,553	1,719
Apr.	13,943	3,757	12,174	1,780
May	13,856	3,894	12,663	2,112

Source: U. S. Tariff Commission.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins. Beginning January, 1951, statistics are listed on a resin-content basis.

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Verdun Industrial Bldg., Verdun, Montreal, Que.

Sales Representatives in Principal Cities
Exclusive Agents for sale in USA of
Harrisons & Crosfield Malayan Latex

Rubber Industry Employment, Wages and Hours

All Rubber Products

	1950				1951			
Mo.	Production Workers (thousands)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Production Workers (thousands)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings
Jan.	187	$60.52	39.4	$1.536	222	66.78	40.4	1.653
Feb.	188	59.90	39.2	1.528	223	63.37	38.9	1.629
Mar.	189	59.70	39.3	1.519	220	65.88	40.0	1.647
Apr.	191	61.76	40.0	1.544	219	65.72	39.9	1.647
May	194	64.52	41.2	1.566	220	68.43	41.3	1.657
June	199	65.08	41.4	1.572	223	....	....	....
July	200	65.59	41.2	1.592	...	....	..	....
Aug.	208	66.25	41.8	1.585	...	....	..	....
Sept.	215	66.58	41.9	1.589	...	....	..	....
Oct.	219	66.29	41.9	1.582	...	....	..	....
Nov.	222	66.52	41.5	1.603	...	....	....	....
Dec.	222	68.76	41.6	1.653	...	....	....	....

Tires and Tubes

Jan.	82.6	67.70	38.4	1.763	91.3	73.69	38.4	1.919
Feb.	83.1	67.22	38.3	1.755	90.6	66.95	35.5	1.886
Mar.	83.4	65.26	37.4	1.745	88.3	71.46	37.6	1.899
Apr.	84.0	69.23	39.0	1.775	87.8	69.47	36.7	1.893
May	85.9	74.60	41.1	1.815	88.6	75.42	39.2	1.924
June	88.0	74.05	40.6	1.824	...	....	..	....
July	88.3	75.22	40.4	1.862	...	....	..	....
Aug.	89.6	76.01	40.8	1.863	...	....	..	....
Sept.	91.7	75.46	40.9	1.845	...	....	..	....
Oct.	92.0	73.12	40.2	1.819	...	....	..	....
Nov.	93.4	73.70	40.1	1.838	...	....	....	....
Dec.	92.1	76.21	39.9	1.910	...	....	....	....

Rubber Footwear

Jan.	20.1	45.87	35.7	1.285	24.9	57.53	41.6	1.383
Feb.	18.8	43.06	34.2	1.259	25.3	55.87	40.6	1.376
Mar.	19.4	51.04	40.0	1.276	25.0	58.17	41.4	1.405
Apr.	19.3	50.36	39.5	1.275	24.8	59.82	42.1	1.421
May	19.1	50.20	39.4	1.274	25.4	61.60	42.9	1.436
June	19.3	52.07	40.3	1.292	...	....	....	....
July	19.2	52.13	39.7	1.313	...	....	..	....
Aug.	20.7	53.93	41.9	1.287	...	....	..	....
Sept.	21.8	53.95	41.5	1.300	...	....	..	....
Oct.	22.8	56.00	42.2	1.327	...	....	..	....
Nov.	23.2	54.52	42.0	1.298	...	....	..	....
Dec.	23.9	59.34	42.6	1.393	...	....	..	....

All Other Rubber Products

Jan.	84.5	57.04	41.3	1.381	105.8	63.06	41.9	1.505
Feb.	86.3	56.43	41.1	1.373	106.3	61.95	41.3	1.500
Mar.	86.2	56.16	40.9	1.373	106.3	63.13	41.7	1.514
Apr.	87.2	57.13	41.1	1.390	106.2	63.92	42.0	1.522
May	88.8	57.92	41.7	1.389	105.7	64.26	42.7	1.505
June	92.0	59.23	42.4	1.397	...	....	....	....
July	92.8	59.08	42.2	1.400	...	....	..	....
Aug.	98.0	60.13	42.8	1.405	...	....	..	....
Sept.	101.0	61.30	42.9	1.429	...	....	..	....
Oct.	104.1	62.48	43.3	1.443	...	....	..	....
Nov.	105.0	62.71	42.6	1.472	...	....	..	....
Dec.	105.7	64.29	42.8	1.502	...	....	..	....

Source: U. S. Department of Commerce and Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who worked during or received pay for the pay period ending nearest the 15th of the month. The employment series have been adjusted to levels indicated by Federal Security Agency data for 1947, and have been carried forward from 1947 bench-mark levels, thereby providing consistent series. Hours and earning data pertain only to production and related workers.

Production Index for the Rubber Industry

Production 1935-1939 = 100

(Based on man-hours)

	1949	1950	1951		1949	1950	1951
Jan.	193	194	244	July	175	222	....
Feb.	188	195	235	Aug.	178	236	....
Mar.	182	197	239	Sept.	174	244	....
Apr.	177	203	238	Oct.	192	250	....
May	178	213	247	Nov.	187	250	..
June	178	221	250	Dec.	193	251	....

Source: U. S. Department of Commerce.

Sales by the Rubber Industry

(In Millions of Dollars)

	1949	1950	1951		1949	1950	1951
Jan.	260	265	454	July	271	454	....
Feb.	251	273	435	Aug.	288	457	....
Mar.	260	293	462	Sept.	272	404	....
Apr.	257	288	441	Oct.	255	405	....
May	248	321	436	Nov.	247	397	....
June	266	350	...	Dec.	245	424	....

Source: U. S. Department of Commerce.

Rubber Manufacturers' Inventories

(Based upon Book-Value)

(In Millions of Dollars)

	1949	1950	1951		1949	1950	1951
Jan.	661	524	564	July	625	501	....
Feb.	661	526	557	Aug.	563	483	....
Mar.	653	532	556	Sept.	538	502	....
Apr.	648	536	566	Oct.	517	524	....
May	650	540	585	Nov.	526	564	....
June	644	544	....	Dec.	531	549	....

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1944	1945	1946	1947	1948	1949	1950
Antimony, Primary:							
Short tons	.....	.....	....	39	41	55	.....
% of total	.....	....	....	.002	.003	.005	.....
Asphalt [a]							
Short tons	20,189	19,483	28,715	32,113	19,967	18,050	.....
% of total	.006	.005	.007	.007	.004	003	.....
Barite (Barytes):							
Short tons	10,000	10,000	20,000	17,000	18,000	14,000	.....
% of total	2.9	2.1	4.4	3.1	2.85	2.53	.....
Carbon Black:							
Short tons	369,015	402,193	470,732	471,790	435,282	383,565	515,184
% of total	94.6	95.5	95.3	94.3	95.5	93.3	92.9
Clay, Kaolin:							
Short tons	59,588	109,936	162,393	166,201	176,965	197,341	.....
% of total	6.8	11.7	12.3	11.5	11.3	13.1	.....
Clay, Fire & Stoneware:							
Short tons	7,160	7,800	12,951	17,970	15,480	.....	.....
% of total	0.1	0.1	0.2	0.2	0.2	.....	.....
Lime:							
Short tons	5,634	7,170	3,193	589	1,154	715	.....
% of total	0.09	0.12	0.05	0.01	0.02	.0002	.....
Litharge:							
Short tons	3,023	1,864	2,131	2,205	2,835	.....	.....
% of total	2.2	1.3	1.6	1.3	1.8	.....	.....
Lithopone:							
Short tons	726	977	1,607	3,085	4,192	3,245	.....
% of total	0.5	0.7	1.1	1.9	3.0	4.1	.....
Mica, Ground:							
Short tons	1,137	3,715	4,951	3,900	4,372	3,856	.....
% of total	2.2	7.1	8.0	6.0	7.0	7.0	.....
Sulfur:							
Short tons	63,000	64,960	72,800	72,800	70,560	59,360	.....
% of total	1.9	2.0	2.2	1.8	1.7	1.5	.....
Talc [b]							
Short tons	51,833	63,758*	65,980	71,840	66,226	53,414	.....
% of total	13.0	16.0	14.4	13.9	13.0	.12	.....
Zinc Oxide:							
Short tons	59,518	63,447	83,776	82,248	82,895	.....	.....
% of total	42.3	49.6	53.1	51.2	54.9	.....	.....

Source: U. S. Bureau of Mines.

Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. * Revised.

CLASSIFIED WANT ADS

RATES:

All Classifications (except Positions Wanted):
10c per word in light face type—Minimum, $3.00
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Positions Wanted:
$1.00 for 30 words or less; extra words, 5c each.

When Box Number is used, add 5 words to word count.

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Advertisements in borders: $15.00 per column inch; maximum, 85 words per inch.

All Classified Advertising must be paid in advance except for advertisers on contract. Send check with copy.

Replies to keyed advertisements will be forwarded to advertiser without charge.

Address all replies to Box Numbers care of RUBBER AGE, 250 West 57th Street, New York 19, N. Y.

Copy for October 1951, issue, must be received by Monday, October 1st.

POSITIONS WANTED

RUBBER CHEMIST: Experienced in rubber footwear, compounding, research and manufacture. Thirteen years' experience. College degree. Married. Address Box 160-P, RUBBER AGE.

CHEMIST: Thirty-two, experienced formulator. Latex compounding, rubber cements, cellulosic lacquers, vinyl solutions, synthetic resins, emulsions, water solubles. Applications include: Industrial adhesives, coatings, finishes, combining, laminating, coated fabrics and paper, etc. Seeks part-time position or consultant work, New York City area. Address Box 177-P, RUBBER AGE.

PRODUCTION MANAGER wishes to be relocated. Experienced in all phases of mechanical and specialty molding, also extruding and lathe cutting. Am interested in permanent position only. Please advise duties and salary. Address Box 194-P, RUBBER AGE.

SALES REPRESENTATIVE in Detroit and Toledo areas desires connection with company manufacturing hose, sheet rubber, extruded, larger mechanicals, etc. Technical, management and sales experience. Could stock some items. Commission basis. Address Box 196-P, RUBBER AGE.

RUBBER PLANTER recently relinquished management in Malaya, seeks similar post elsewhere. Knowledge felling, burning, lining, holing, planting; also bud grafting and estate routine and factory management. Address Box 200-P, RUBBER AGE.

GRADUATE ENGINEER: Chief chemist or technical superintendent. Fifteen years in rubber plants here and abroad. Thorough experience in compounding and all phases of molded and extruded goods, cycle tires, belts, balls, every kind of footwear, coatings. Capable complete charge of a plant. Desires change. Address Box 201-P, RUBBER AGE.

RUBBER CHEMIST: Seventeen years industrial experience with thirteen in rubber industry. Experienced in development compounding, factory processing, trouble shooting, raw materials evaluation on general line of mechanical goods. At present, chief chemist of small company. Desire greater challenge and more opportunity. Chemical engineering graduate. Age thirty-seven and married. Address Box 207-P, RUBBER AGE.

PRODUCT ENGINEER: Graduate mechanical, over ten years varied experience tests, design, research administration, interested in transfer offering advancement in technical service field. Address Box 208-P, RUBBER AGE.

PRODUCTION MANAGER or PLANT MANAGER: Rubber engineer of over twenty years broad practical experience in large, medium and small plants manufacturing mechanical and sponge rubber products. Experienced in all phases of the industry. Competent labor organizer for best production at low costs. Address Box 211-P, RUBBER AGE.

RUBBER TECHNICAL SALES: Experienced tire compounder desires position with carbon black or rubber chemical supplier. Over fifteen years in compounding, development, supervision and field contact work. Chemical engineering graduate, 1936. Now employed. Address Box 212-P, RUBBER AGE.

GRADUATE CHEMIST and TECHNOLOGIST: Fifteen years experience rubber and plastic cables, mechanicals, technical sales and management, desires new position in responsible capacity, or technical sales with company merchandising raw materials. Address Box 217-P, RUBBER AGE.

RUBBER and PLASTIC CHEMIST: B. S. degree, middle-aged, extensive experience in laboratory control, development and production. Desires supervisory position with responsible organization. Minimum salary $5,000. Address Box 218-P, RUBBER AGE.

HELP WANTED

TECHNICAL SALESMAN

Mature, technically educated man with synthetic rubber and vinyl compounding experience. This might include laboratory, production and sales development background. Age twenty-seven to thirty-three. Inquiries confidential.

DEWEY AND ALMY CHEMICAL COMPANY
Organic Chemicals Division
Cambridge 40, Mass.

CHEMISTS—CHEMICAL ENGINEERS
"Positions with the better firms"

EXTRUSION CHEMIST, both "working" and "administrative". Must be top flight man. $10,000
CHIEF CHEMIST, mechanical rubber ..... open
"Many Jr. Positions"

Call, write or wire—GLADYS HUNTING
DRAKE PERSONNEL, INC.
7 W. Madison St., Chicago 2, Ill., FI 6-2100

PRODUCTION AND DEVELOPMENT: Chemist familiar with mixing and formulations of vinyls for extrusion. Nylon experience desired but not required. Long established and progressive New England firm. Letter giving full details requested. Address Box 174-W, RUBBER AGE.

SPONGE RUBBER CHEMIST: Excellent opportunity for man with experience and ambition. Permanent position with established firm located in Pennsylvania. Salary open. Submit detailed resume of business experience and personal qualifications first letter. Address Box 179-W, RUBBER AGE.

Experienced PRODUCTION and DEVELOPMENT CHEMIST to take charge of a new department in adhesive coatings, synthetic and natural rubber; resins; also all types of cements, for a well financed, middle size, progressive company located in the middle west. Give full details in first letter; also salary expected. Address Box 195-W, RUBBER AGE.

TECHNICIAN: Rubber compounding experience preferred, by communication wire manufacturer. Address Box 198-W, RUBBER AGE.

CHEMICAL ENGINEER
Man with latex dip experience. Capable of developing compounds and equipment for continuous latex dip coating. Unusual opportunity for man with initiative and ability to develop new product for well established AAA-1 company. Permanent position. Location Southern New England.
Address Box 199-W, RUBBER AGE

RUBBER CHEMIST: Graduate, experienced in compounding and control work for mechanical goods plant in Southeast. Must be capable of developing new products. Excellent opportunity. Address Box 202-W, RUBBER AGE.

✓ CHECK WITH US FOR
RUBBER and PLASTIC SCRAP
✓ UNCURED COMPOUNDS ✓ CURED OVERFLOW
✓ POLYETHYLENE ✓ VINYL (PVC)
ROTEX RUBBER COMPANY, INC.
1-23 JABEZ ST., NEWARK 5, N. J. 40 YEARS EXPERIENCE TELEPHONE: HUMBOLDT 2-8000

HELP WANTED (Continued)

COMPOUNDER: Development and or process control, compounding of tires and tubes, at Akron, Ohio rubber plant. Our employees know of this advertisement. Give full details of qualifications, experience, age and salary desired. Address Box 203-W, RUBBER AGE.

TECHNICAL SALES: Rubber compounding experience necessary. Midwestern territory for nationally established firm calling on rubber, plastic and allied industries. State experience. Address Box 206-W, RUBBER AGE.

WIRE and CABLE CHEMIST: For development and process control work. Degree and several years experience required. Address Chief Chemist, Collyer Insulated Wire Co., Roosevelt Ave., Pawtucket, R. I.

Our associated factory in the Philippines is interested to engage the services of a

qualified tire compounder.

Please state in first letter complete personal data, education, past experience, present employer, salary desired.

Address reply to:
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BOUGHT—SOLD: Pigments, Chemicals, Colors, Resins, Solvents, Oils, Waxes, Lacquers, Plasticizers, Plastics. Other materials, Supplies, Equipment, etc. CHEMICAL SERVICE CORP., 84-04 Beaver Street, New York 5, N. Y.

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MONTAN WAX
From Our Stocks

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New York 4, N. Y.
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COMPOUNDING AND CALENDERING
All work done under careful supervision. Contract work invited. Also precision grinding and pulverizing of many friable plastics and scrap. Phone: New Haven 8-6151. **ELM CITY RUBBER COMPANY**
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Light Color
Master Batching
Mixing of All Kinds
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BLACK MASTER BATCH **MIXING**
COMPOUNDING CHEMIST AT YOUR SERVICE
Phone 4601 Collect
RENCO
DIVISION
LAKE ZURICH, ILL.
MOLDED RUBBER PRODUCTS

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Master Batching
Mixing of all kinds
BESTREAD PRODUCTS CO. STOUGHTON, MASS.

SMALL RUBBER MANUFACTURER has time available for contract work on molded goods. Address Box 191-B, Rubber Age.

FOR SALE
or
RENT
FULLY EQUIPPED PLANT
Write
L. ALBERT & SON
TRENTON, N. J. or AKRON, OHIO

CUSTOM MILLING and DISSOLVING
Unlimited facilities available. Large raw materials stock, modern equipment, competent staff, laboratory controlled.
Manufacturers of Rubber Adhesives since 1913
RUBBER AND ASBESTOS CORP.
225 Belleville Avenue Bloomfield, N. J.
Bloomfield 2-1300 or Rector 2-6121

FOR SALE
RUBBER PLANT
Located on West Coast, completely equipped with latest machinery for latex dipping. Plenty of forms for doll skins and doing lots of other commercial dipping. *This is a real opportunity and the price is right.*
Details to responsible parties.
Address Box 165-B | RUBBER AGE
250 W. 57th St., New York 19, N. Y.

CUSTOM MIXING
We do milling and compounding of all types —blacks or colors—Master Batches. All mixing done under careful supervision and laboratory control.
Phone: Butler 9-0400
Pequanoc Rubber Company Butler, N. J.

BUSINESS OPPORTUNITIES (Continued)

DEPOLYMERIZED RUBBER

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Permanently Liquid
100% Rubber Hydrocarbon

Produced in a range of viscosities from high grade smoked sheets under careful laboratory control.

Unique application as

Adhesives and Coatings
Casting Compounds
Abrasive Binders
Vulcanizable Plasticizer

Your inquiry is invited

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Manufacturers of Rubber Adhesives Since 1913

RUBBER AND ASBESTOS CORP.
225 Belleville Avenue **Bloomfield, N. J.**
Bloomfield 2-1300 or Rector 2-6121

EQUIPMENT WANTED

WANTED
Complete rubber plants.
Also individual items such as: 2-roll mills, calenders, mixers and Banbury Mixers.
R. GELB & SONS, INC.
State Highway No. 29, Union, New Jersey

WANTED: No. 3A or No. 9 Banbury Mixer. Also No. 3 Banbury Rotors. Address Box 204-E, RUBBER AGE.

WANTED: 100-150 gal. heavy duty jacketed mixer with sigma arms, preferably with 20 hp motor. Address Box 209-E, RUBBER AGE.

WANTED: Small extruder equipped with motor and drive. Also 24" x 24" or 30" x 30" press. Good condition. Address Box 210-E, RUBBER AGE.

EQUIPMENT FOR SALE

SAVE WITH GUARANTEED REBUILT EQUIPMENT—Hydraulic Presses: 24" x 24", 18" ram, 318 tons; 24" x 56", 450 tons, multiple opening; 24" x 24", 16" ram, 250 tons; 24" x 24", 12" ram, 170 tons; 24" x 42", 2—12" rams, 340 tons; 42" x 42", 16" ram, 250 tons; 36" x 36", 12" ram, 141 tons; 20" x 18", 10" ram, 118 tons; 20" x 20", 10" ram, 118 tons; 19" x 24", 10" ram, 78 tons; 22" x 15", 8" ram, 75 tons; 27" x 27", 8" ram, 75 tons; 15" x 15", 8" ram, 75 tons; 12" x 12", 7½" ram, 60 tons; 12" x 12", 6½" ram, 50 tons; 8" x 9½", 4½" ram, 20 tons; 16" x 16", 3½" ram, 12 tons. Laboratory Presses: 10 ton Carver, 6" x 6"; 30 ton Watson-Stillman, 6" x 6". Laboratory Mills and Calenders: (New) M.D.; Thropp Mill, 16" x 40" M.D. New Dual Pumping Units, all sizes. Extruders: Royle Rubber #2; Royle Plastic #1. Preform Presses: Stokes T; Colton 5½T; Stokes DDS4 with Reeves Drives. Also Mixers, Vulcanizers, Accumulators, etc. UNIVERSAL HYDRAULIC MACHINERY COMPANY, 285 Hudson Street, New York 13, N. Y.

Continued on Page 778

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ALL STEEL, ALL WELDED CONSTRUCTION, with forged steel hubs for 1¼", 1½" and 2" square bars.
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Also Special Trucks (Leaf Type) Racks, Tables and Jigs.
Used in manufacturing rubber and plastic products.
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MILLS, CALENDERS, TUBERS, VULCANIZERS, PUMPS, ACCUMULATORS, MIXERS, PULVERIZERS, HYDRAULIC PRESSES, CUTTING MACHINES
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CABLE: "URME"

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Buys of the month.....

SPECIAL
Scarce Late Type Equipment! Available Immediately!!

1 22" x 60" Farrel-Birmingham Mill, complete with 125 HP Synchronous Motor, reduction voltage starting, enclosed Farrel Herringbone Reducer with outboard bearings, flood lubrication, etc., complete in every detail. Used approximately five years. Excellent condition.

1 #9 Banbury Mixer with Farrel 84" Mill, individually driven. Complete. Late type equipment, excellent condition.

2 24" x 84" Farrel Mills in one line with 300 HP Synchronous Motor and herringbone reducer; late equipment; excellent condition.

1 6" National Erie Strainer with powered cut off, etc.
24" x 24" Presses, 2-openings, 18" dia. ram. (NEW)

ALSO:

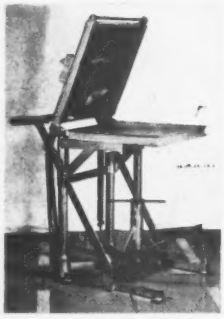
19" x 24" x 30" Farrel Heavy Duty Refiner with drive and motor
16" x 40" Mills with drives and motors (individual or line shaft drive)
Black Rock Cutters, type 4M
Vulcanizers—all sizes—new and used
3½" National Erie Extruder—24" x 66" Calender
16" x 42" Calender—24" x 24" Presses, 18" rams (used)
36" Press, 18" Ram—Hydraulic Bale Cutter

and many more good pieces of equipment for rubber processing.

Let us know what equipment you may have available that is not being used, and for very little you may be able to exchange it for additional late type machinery that you require at this time.

AKRON RUBBER MACHINERY CO.
P.O. Box 88 Phone WAlbridge 1183-4 Akron, O.

SPONGE RUBBER VULCANIZING PRESS
HIGHEST EFFICIENCY LOW COST



Rapid operation; easily closed and opened.

Guaranteed sufficient pressure for all sponge rubber requirements.

Standard Platen Size 26" x 26". Floor space required, 30" x 30" — No floor space lost by work table. All other special sizes of platens available to fit any requirement.

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Phone: WEbster 9-3548

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FOR SALE

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Address Box 197-S, RUBBER AGE.

FOR SALE: 30 ton Watson-Stillman hydraulic laboratory press with pedestal. 12" x 12" platens electrically heated, water cooled. 3½" ram. All working parts new. L. E. COREY, 196 Grand Ave., Akron, Ohio.

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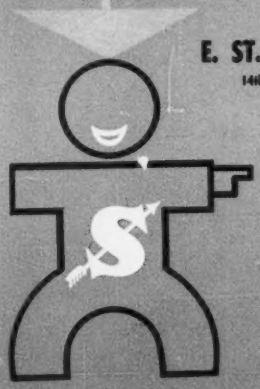

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